

RAILROAD GAZETTE

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A NEW BOOK. THE ECONOMIC THEORY OF THE LOCATION OF RAILWAYS, By ARTHUR M. WELLINGTON, C. E.

[See Advertisement on page ix.]
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Accountants:	Calhoun & Steele, 20 Nassau street, N. Y.	i
Air Brakes:	Wm. Loughridge, Baltimore	i
Asiatic:	Lake Erie Iron Co., Cleveland, O.	vi
Boiler:	A. F. Roberts & Co., Philadelphia	v
Boiler:	Pennsylvania Forge & Iron Co., Phila.	vi
Boiler:	Wilson Walker & Co., Pittsburgh	vi
Boiler:	Boiler Pumps:	
Boiler:	J. P. Richards, Providence, R. I.	vii
Boiler:	Boiler, Ruts, Boiler Rivets, etc.:	
Boiler:	Boiler & Townsend, Philadelphia	vii
Boiler:	Boiler:	
Boiler:	American Bridge Co., Chicago	iv
Boiler:	Baltimore Bridge Co., Baltimore	iv
Boiler:	Cincinnati Bridge Co., Cincinnati	iv
Boiler:	Clark, Reeves & Co., Philadelphia	iv
Boiler:	Outsides & Saylor, Philadelphia	iv
Boiler:	Delaware Bridge Co., 82 Wall street, N. Y.	iv
Boiler:	Delaware Bridge & Iron Works, Detroit	iv
Boiler:	Delaware Iron Co., Wilm., & 79 Liberty st., N. Y.	iv
Boiler:	R. H. Hopkins & Co., St. Louis	iv
Boiler:	Edging & Morris, Athens, Pa.	iv
Boiler:	Edging Bridge Company, Philadelphia	iv
Boiler:	Edging Bridge & Iron Works, Rochester	iv
Boiler:	Edging & Henderson, Trenton, N. J.	iv
Boiler:	Edging Bridge & Iron Co., Louisville	iv
Boiler:	Edging Bridge Works, Buffalo	iv
Boiler:	Edging Bridge Co., Canton, O.	iv
Boiler:	Edging Boilers:	
Boiler:	Edging & Gaylord, Cleveland	iv
Boiler:	Edging Timber and Lumber:	
Boiler:	Alex. McClure & Co., Pittsburgh	iv
Boiler:	Case:	
Boiler:	J. G. Smith, Manufacturing Co., Dayton, O.	viii
Boiler:	J. G. Smith & Sons, Philadelphia	vi
Boiler:	Karlson & Hollingsworth Co., Wilmington	vi
Boiler:	J. M. Jones & Co., West Troy	vi
Boiler:	Terre Haute Car & Mfg. Co., Terre Haute, Ind.	vi
Boiler:	Car Builders and Stoves:	
Boiler:	Barber, Smith & Co., New York	vii
Boiler:	Barber Chilton, Boston	vii
Boiler:	Car Seats:	
Boiler:	Barber & Co., 376 Pearl st., N. Y.	vii
Boiler:	Car Wheels:	
Boiler:	Baltimore Car-Wheel Co., Baltimore	iii
Boiler:	Barnum Richardson Co., Lima, Pa.	iii
Boiler:	Barnum & Richardson Manufacturing Co., Chicago	iii
Boiler:	Car Wheel & Axle Co., Cleveland	iii
Boiler:	Car Wheel & Axle Co., Waverly, N. Y.	iii
Boiler:	Car Wheel & Axle Co., Huntington, West Va.	iii
Boiler:	Car Wheel & Axle Co., Cleveland, O.	iii
Boiler:	Car Wheel & Axle Co., Columbus, O.	iii
Boiler:	Car Wheel & Axle Co., Philadelphia	iii

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Louisville Car-Wheel & Ry. Supply Co., Louisville	viii
McKee & Fuller, Catonsville, Md.	iii
Thomas May & Co., Indianapolis	ii
Mowry Car & Wheel Co., Cincinnati	iii
Rampco Wheel & Foundry Co., Ramapo, N. Y.	iii
Taylor Iron Works, High Bridge, N. J.	iii
A. Wiley & Sons, Philadelphia	iii
Cedar Tanks:	
Geo. J. Burkhardt, Philadelphia, Pa.	vii
Checks:	
John Robbins, Boston	vii
Civil Engineers:	
W. J. Nicolls, Baltimore	i
R. E. Ricker & Co., New York	xiv
H. A. St. John, 31 Broad st., N. Y.	—
Wilson Bros. & Co., Philadelphia	i
Contractors:	
J. B. Dacey & Co., Boston	xiv
Cordage:	
Elizabethport Steam Cordage Co., N. Y.	xii
Cushioned Helve Hammers:	
Bradley Manufacturing Co., Syracuse	v
Drilling Machines:	
Thorne, DeHaven & Co., Philadelphia	vi
Duplex Tickets:	
American Duplex Ticket Co., 860 Broadway, N. Y.	viii
Electric Pumps:	
Geo. H. Biles, Chicago	v
Employment:	
J. B. Dacey & Co., Boston	xiv
Excavators:	
S. B. Alger, Long Island City, N. Y.	—
John Southern & Co., Boston	vi
Files:	
G. & H. Barnett, Philadelphia	vi
Frogs and Crossings:	
Penna. Steel Co., Steel Works P. O., Pa.	viii
Seamless Steel Ware & Frog Co., Harrisburg	xii
H. & H. Elliott, E. St. Louis, Ill.	—
Holston Central	—
Copeland & Bacon, New York	ii
Hotels:	
The Brunswick, Boston	—
Hydraulic Jacks:	
Richard Dugden, 21 Columbia st., N. Y.	vii
McCoy & Co., 134 Duane st., N. Y.	—
Injectors:	
Wm. Sellers & Co., Phila. & 79 Liberty st., N. Y.	xiv
Iron Work for Contractors:	
Edgewood Iron Co., Wilm. & 79 Liberty st., N. Y.	v
Hoisting Engines:	
Schweizer & Gruve, 71 Broadway, N. Y.	xiv
Journal Bearings:	
B. W. Baldwin, Pittsburgh	—
Clark & Kennett, St. Louis	viii
C. J. A. Dick, Philadelphia	vii
Geo. R. Menely & Co., West Troy, N. Y.	—
Locomotives:	
Baldwin Locomotive Works, Philadelphia	viii
Brooks Locomotive Works, Dunkirk, N. Y.	xi
Danforth Loco. & Mach. Co., Paterson, N. J.	xi
Dickson Mfg. Co., Scranton, Pa.	xi
Grant Locomotive Works, Paterson, N. J.	xi
Hinkley Locomotive Works, Boston	xii
Manchester Loco. Works, Manchester, N. H.	xii
Mason Machine Co., Taunton, Mass.	x
National Loco. Works, Connellsville, Pa.	xii
Pittsburgh Loco. & Car Works, Pittsburgh	xii
Porter, Bell & Co., Pittsburgh	xii
Rogers Loco. & Machine Works, Paterson, N. J.	xii
Schenectady Loco. Works, Schenectady, N. Y.	xii
Taunton Loco. Mfg. Co., Taunton, Mass.	xii
Locomotive Balancers:	
T. S. Morton, 65 Elizabeth st., N. Y.	—
Locomotives to Lease:	
U. S. Rolling Stock Co., 74 Wall st., N. Y.	i
Machinists' Tools:	
W. B. Bennett & Son, Philadelphia	vi
Ferris & Miles, Philadelphia	vii
H. Harrington & Son, Philadelphia	vii
Wm. Sellers & Co., Phila. & 79 Liberty st., N. Y.	xiv
Mortising Machines:	
Leone & Bodley, Cincinnati	ix
Oils:	
S. A. Grim, Pittsburgh, Pa.	—
Ferris & Miles, Philadelphia	vii
F. S. Pease, Buffalo	viii
E. Maxwell & Co., St. Louis	vii
Paints:	
Iron-Clad Paint Co., Cleveland, O.	vi
E. Maxwell & Co., St. Louis	vii
Princo's Metallic Paint Co., 225 Pearl st., N. Y.	ix
Rogers & Co., Port Wayne, Ind.	—
Patents:	
Thomas D. Stetson, 23 Murray st., N. Y.	ix
Photographs:	
J. Mallen, Lexington, Ky.	xii
Portable Track and Cars:	
Chl. Port. Track & Car Co., Chicago	xiv
Quick-Stop Train Brakes:	
Wm. Loughridge, Baltimore	i
Rails:	
Albany & Renss. Iron & Steel Co., Troy, N. Y.	x
Cambria Iron Co., Johnstown, Pa.	x
Cleve. Rolling Mill Co., Cleveland, O.	x
Dana & Co., 20 Nassau st., N. Y.	i
Edgar Thomson Steel Co., Pittsburgh	x
Geo. A. Evans & Co., N. Y.	x
C. W. Matthews, Philadelphia	i
North Chl. Rolling Mill Co., Chicago	x
Springfield Iron Co., Springfield, Ill.	x
Holston Central	—
Rail Fastenings:	
American Ry. Supply Co., Pittsburgh	v
Fisher & Norris, Trenton, N. J.	vi
Loomis Nut-Lock Washer Co., Cleveland	vii
Volcanized Fibre Co., 17 Dry st., N. Y.	vii
Railroads and Transportation Lines:	
Atlantic & Great Western	xii
Baltimore & Ohio	xii
Boston & Albany	xii
Chicago & Alton	xii
Chicago & Burlington & Quincy	xii
Chicago & Northwestern	xii
Chicago, Rock Island & Pacific	xii
Cleveland, Col. Cinn. & Indianapolis	xii
Erie Railway Co.	xii
Empire Transportation Co.	xii
Illino. Central	xii
Michigan Central	xii
Missouri, Kansas & Texas	xii
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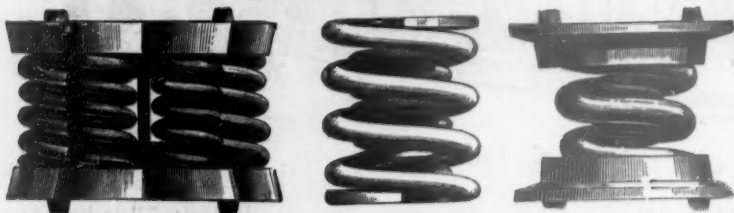
United States Patent No. 60,876 August 11, 1868,
" " " 131,788 October 1, 1872,
" " " 132,416 " 23, 1872,
" " " 160,811 Nov. 9, 1875, and
whereas of late various Signalling Apparatus have been advertised or made, which are infringements of the above or of some or one of the above-mentioned United States Patents,
All persons and companies are hereby cautioned against making, vending, or using any such Signalling Apparatus which are infringements of the before-mentioned patents or some or one of them; and notice is hereby given that they will be held responsible for any such infringements.
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Philadelphia, Wilmington & Baltimore	xiii
Union Pacific	xiii
Wisconsin Central	xiii
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J. K. Kennedy & Co., 4 Cedar st., N. Y.	i
Railroad Car Brakes:	
Wm. Loughridge, Baltimore	i
Railroad Chairs:	
Tredegar Co., Richmond, Va.	vii
Railway Signals:	
Hall Ry. Signal Co., West Meriden, Ct.	i
Saxby & Farmer, London	i
Toucey & Buchanan, Interlock. Sig. Co., Harrisburg	ix
Refrigerator Cars:	
Tiffany Refriger. Car Co., Chicago	vi
Road Rollers:	
Pioneer Iron Works, Brooklyn	xiv
Rolling Stock Wanted:	
Wm. Douglas & Co., Toronto	ix
Rubber Goods:	
Cleveland Rubber Co., Cleveland, O.	ii
Hamilton Rubber Co., Trenton, N. J.	ii
Mercer Rubber Co., Trenton, N. J.	ii
Rubber-Step Mfg. Co., 45 Haverhill st., Boston	ii
Safe Depots:	
Safe-Deposit Co., 140 Broadway, N. Y.	i
Sash Chains:	
T. S. Morton, 65 Elizabeth st., N. Y.	—
Shafting:	
Wm. Sellers & Co., Phila. & 79 Liberty st., N. Y.	xiv
Spikes:	
Dilworth, Porter & Co., Pittsburgh	vi
Pottsville Spike Works, Pottsville, Pa.	ii
Tudor Iron Works, St. Louis and Chicago	—
Springs:	
Columbia Car Spring Co., 322 Seventh ave., N. Y.	ii
Culmer Spring Co., Pittsburgh	ii
A. French & Co., Pittsburgh	ii
Steel and Steel Tires:	
Isaac Jenks & Sons, 135 and 136 Duane st., N. Y.	—
Midvale Steel Works, Nicetown, Philadelphia	xiv
Thomas Fawcett & Son, 15 Gold st., N. Y.	vii
Standard Steel Works, Philadelphia	x
Switches:	
Pennsylvania Steel Co., Harrisburg	vi
Wharton R. B. Switch Co., Philadelphia	vii
Taps and Dies:	
H. S. Manning & Co., 113 Liberty st., N. Y.	vii
Telegraphic & Electric Instruments:	
Chas. Williams, Jr., Boston	ix
Track Tools:	
Metcalfe, Paul & Co., Pittsburgh	v
Train Reflectors:	
E. S. Richards, Chicago	vii
Turn Tables for Railways:	
Wm. Sellers & Co., Phila. & 79 Liberty st., N. Y.	xiv
Valves:	
Ludlow Valve Manufacturing Co., Troy, N. Y.	x
Valves	
E. S. Richards, Chicago	x
Watches:	
Wm. Sellers & Co., 323 Pearl st., N. Y.	xiv
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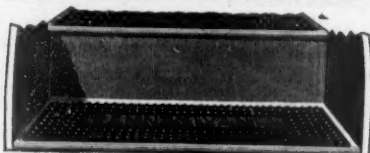
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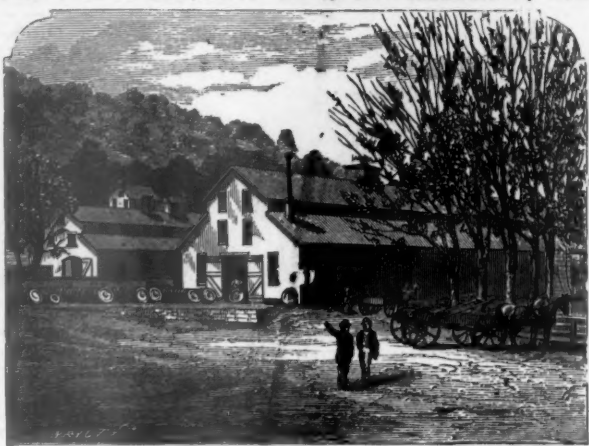
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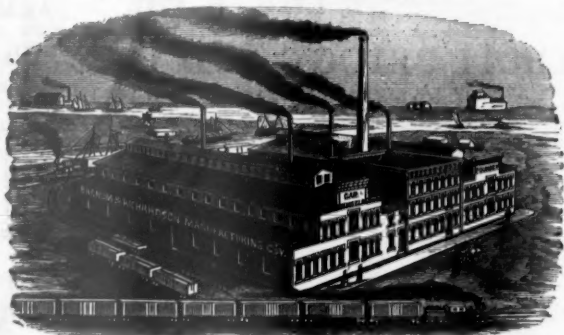
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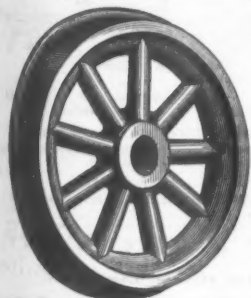
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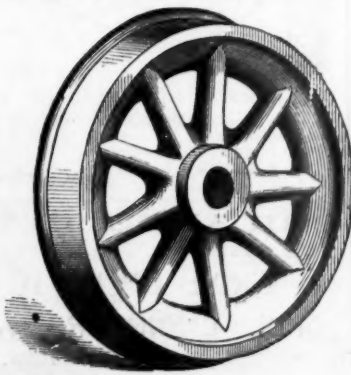
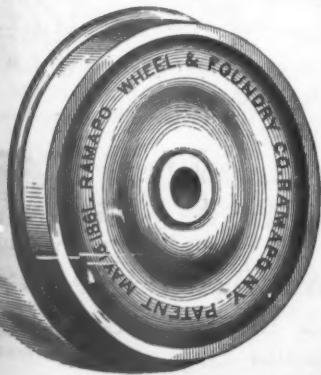
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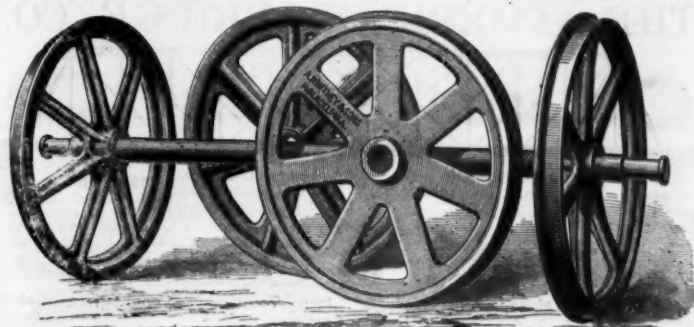


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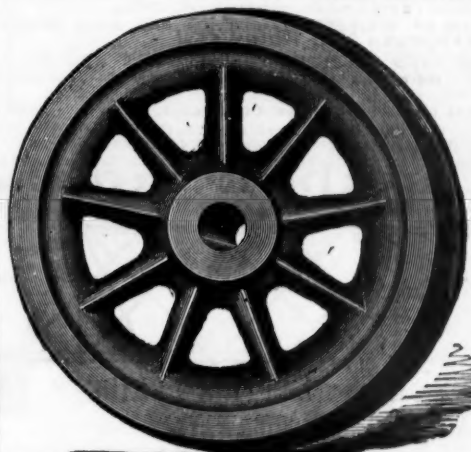
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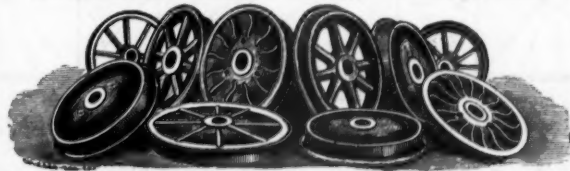
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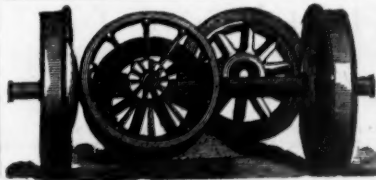


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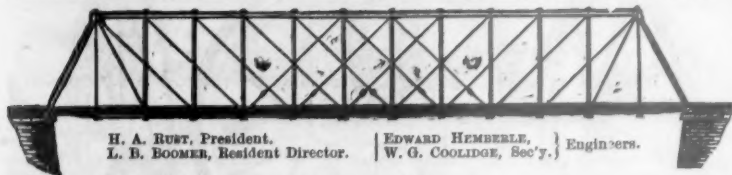
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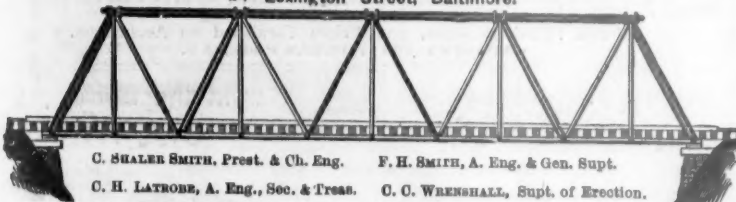
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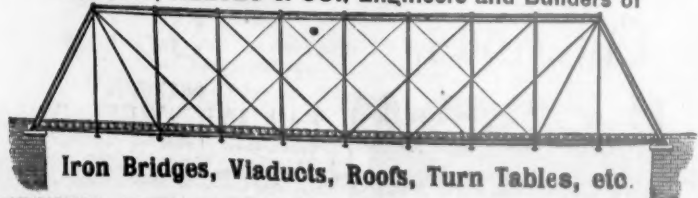
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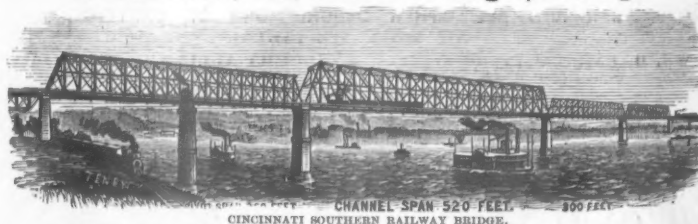
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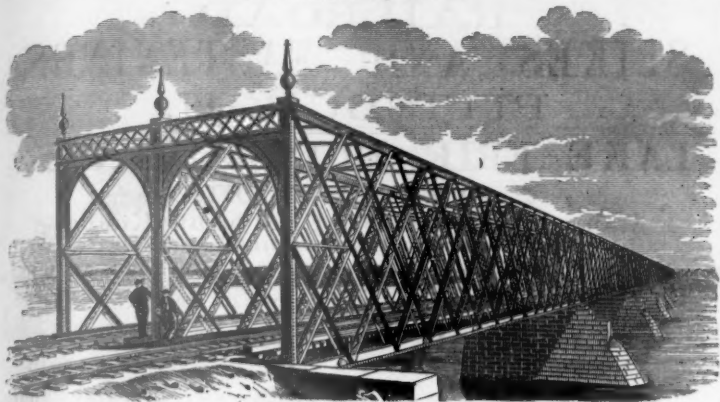
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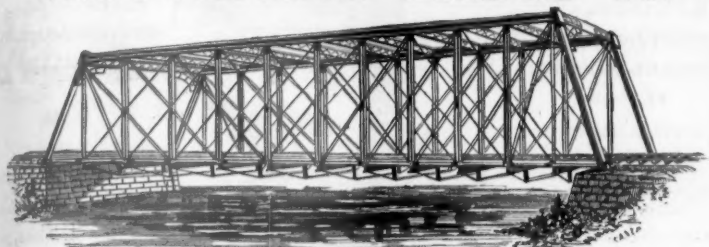
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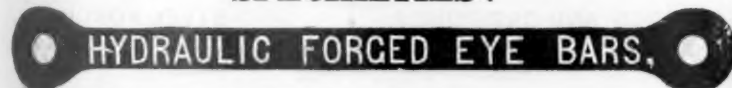
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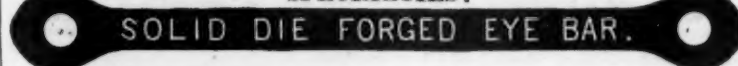
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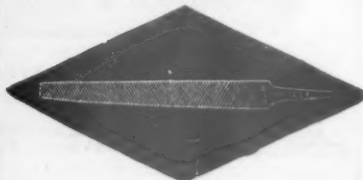
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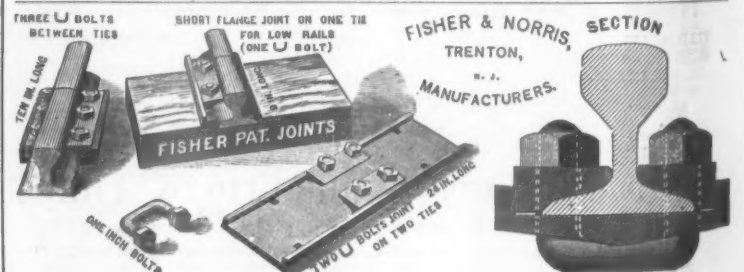
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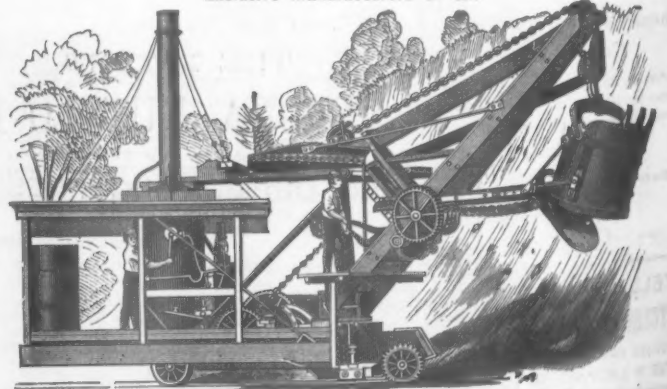
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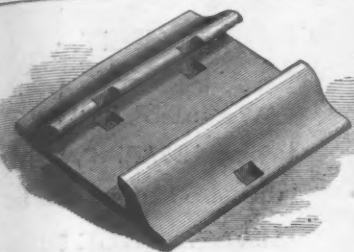
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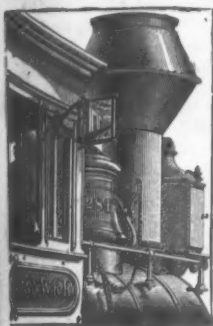


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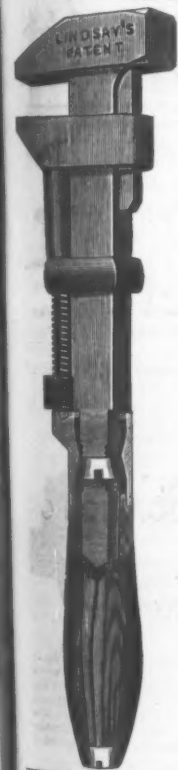
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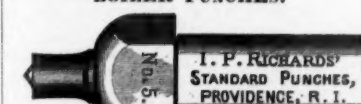
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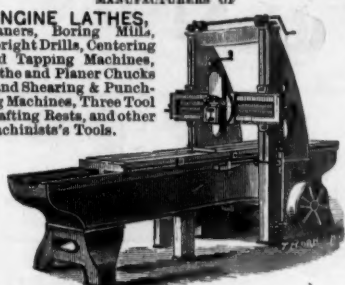
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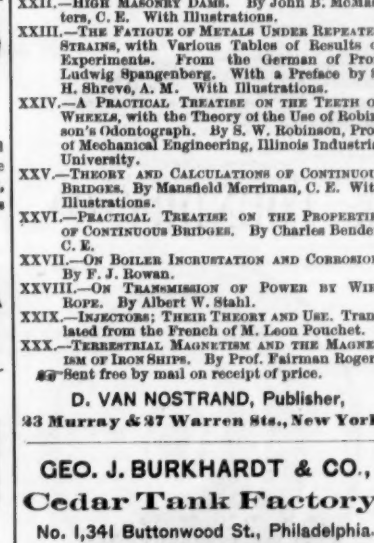
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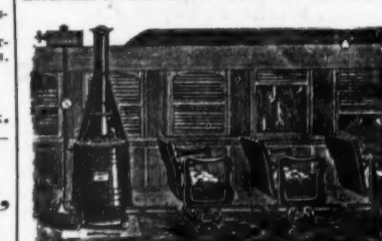
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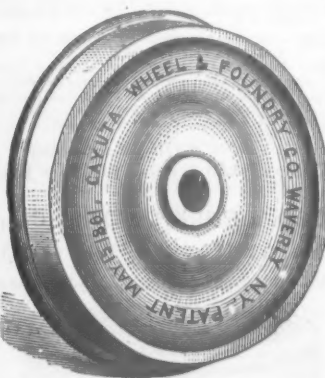
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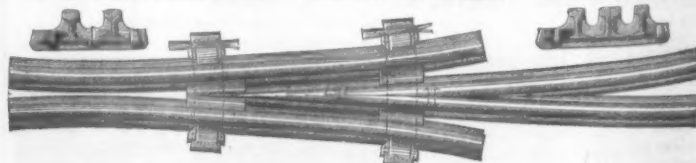
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FRIDAY, JUNE 1, 1877.

Contributions.

Signal Equipment of the Pennsylvania Railroad—Centennial System of Tracks.

BY R. H. SOULE.

(Continued from page 230.)

Of the thirty-four indicators enumerated, it will be noted that twenty-two worked on the automatic plan, as repeaters of the movements of adjacent signals, while twelve were worked independently by the operators, with ordinary button circuit-closers.

The latter arrangement may be adopted from either of three reasons: First, because the electric circuits may in some cases be thereby simplified and shortened; second, because there are emergencies in which it is desirable to work an indicator without operating the signal to which it would otherwise presumptively be connected; and third, because the indicator is sometimes used merely as a notification that a block is occupied.

A third principal feature in the general equipment was the bell wires, and the arbitrary code of signals between operators and switchmen through their means. The bell wires were established from two principal reasons: First, to afford electric communication where the use of the Morse telegraph was impracticable; second, to provide a means of reporting trains independent of the main wires, where contention for circuit would have caused provoking delays. (Inasmuch as the blocks are very short between Hestonville and the city, the utmost promptness is requisite in making such reports). The bell wires were as follows:

TABLE OF BELL WIRES.

1. Between tunnel switch house and Bridge street switch house, 2 gongs.
2. Between depot tower and Bridge street switch house, 2 gongs.
3. Between depot tower and Thirty-sixth street tower, via Thirty-third street switch house, 3 gongs.
4. Between "3" office (New York Division) and Thirty-sixth street tower, 2 gongs.
5. Between "3" office (New York Division) and Mantua tower, 2 gongs.
6. Between Train Master's office and Centennial switch house, 2 gongs.

Wire No. 1 enables the switchmen to come to mutual understandings as to the passage of trains over the single track between their posts, a code of bell-tap questions and answers having been established for that purpose. By referring back to the table of signals, it will be noticed that 1 E and 7 E are cleared, each from the place where the other is located, so that there must be co-operation between both switchmen to allow of the passage of any train whatever.

Wire No. 2 puts the Bridge street switchman in communication with the operator at depot tower, from which place he must obtain permission to pass any train or engine on to the main out-bound track.

Wire No. 3 is for the benefit of switchmen at depot tower, Thirty-third street and Thirty-sixth street. It is operated on only from its terminal points, but the gong at Thirty-third street switch house enables the operator at that place to know what trains are coming in either direction. When a train is about to pass out from West Philadelphia it is very important that the operator at Thirty-sixth street should know it in ample time to get his crossing clear of freights, and set his switches conformably with the destination of the train in question, as three different routes may be taken from that point. On the other hand, it is equally important that the depot switchmen and yard crews should know when a train is about to arrive, and where from, as the latter fact decides on what track it shall unload its passengers. Again, as many in-bound trains did not come into the West Philadelphia depot at all, but passed on to Market street, or to some southern destination, the provision of a gong at Thirty-third street gave the switchman at that point sufficiently early notification to enable him to cross the train out on to the track marked "Market street trains" or "southern trains." Hence the establishment between these signal stations of a code of bell-tap signals which gives information as to the whither and the whence of all trains passing in either direction. Whenever a train is about to arrive at the West Philadelphia depot, the operator at depot tower, on the receipt of his bell-tap signal from Thirty-sixth street, repeats it on a mammoth gong outside the tower, thus giving all hands a timely notification of the fact.

Wire No. 4 was worked between "3" office and Thirty-sixth street to notify operators of the approach of trains from one tower towards the other.

Wire No. 5 furnished the same facilities of bell-tap communication between "3" office and Mantua tower.

Wire No. 6 was solely for the purpose of instructing the switchman at the Centennial switch house as to the destination of departing trains, so that switches might be set accordingly.

Among some of the Rousseau signals, electrical "interlocking" was performed. The object arrived at, in each case, was to effect such an arrangement of the circuits that it should not be possible for the two signals to show "clear" at the same time. This was the only limitation, as it was frequently necessary either that both should stand at "block" or one at "block" and the other at "clear." The following are some of the cases of this electrical interlocking:

Signals 1 E and 7 E were interlocked, because they each gave admission to the piece of single track between them.

Signals 3 E and 4 E were interlocked to preclude the possibility of collision between in-bound trains and trains or engines backing out of in-bound side of depot.

Signals 5 E and 6 E were interlocked because they governed trains on two adjacent tracks which converged into one at the Bridge street switches.

At Thirty-sixth street, Mantua and Belmont towers, which were equipped with apparatus for moving both the switches and signals adjacent, interlocking of the manipulating levers was accomplished by mechanical devices, and carried out to the fullest possible degree of its development. This mutual interlocking of the operating levers, when properly designed and adjusted, guarantees the following important desiderata:

1st. The impossibility of giving to any train a signal to advance, until the route implied by that signal has been perfected by setting the switches conformably with it.

2d. The impossibility of altering the setting of any of these switches over which the approaching train has to pass, after and while the safety signal has been given.

3d. The impossibility of preparing routes and giving safety signals simultaneously to trains which would conflict with one another if allowed to advance at the same time.

By the use of interlocking apparatus which fulfills these requirements, practically infallible mechanism is made to do the work of fallible human judgment; while, moreover, the concentration of the apparatus (which is essential to the accomplishment of the interlocking) enables one person to assume the formerly distinct and diverse duties of switchman, signalman and telegraph operator.

Perhaps the best way to obtain an idea of the consecutive regulations of the signals, etc., which have been enumerated and described, would be to take the case of a single train, traversing nearly the whole extent of the system, and record the duties of each signalman or switchman as the train progresses.

Let us suppose a train about to leave the Centennial for Baltimore via the tunnel under Market street. Suppose it to be standing on track C in front of the station.

The Train-Master, when ready to dispatch the train, clears the signal 36 E. (The normal condition of signals 34 E, 35 E and 36 E is at "block.") This signal having an indicator (No. 34) in the adjacent switch house, the switchman is therefore at

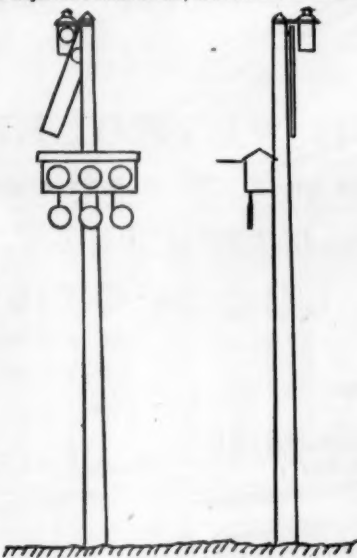


Fig. 5

the same time notified of the fact that a train is about to start out from track C, and he awaits instructions from the Train-Master as to its destination. These instructions the Train-Master gives, immediately after having cleared the signal, through bell wire No. 6, and the switchman has ample time to set his switches accordingly.

The Train-Master then, by telegraph, calls up all the operators along the path of the train, viz., Belmont tower, Mantua tower, Thirty-sixth street tower, Thirty-third street switch house, and depot tower, and notifies them of the departure of a train for Baltimore.

In this notification, the answer to the telegraphic call was not waited for, but the message was proceeded with as soon as all the offices had been enumerated in the call. This arrangement obviated delay and kept the operators on the alert.

Belmont tower, in preparation for the train, lowers his semaphore signal 29 S; the interlocking mechanism requiring, however, that signals 30 S and 31 S should first be at "block." For this train no switches would have to be operated. When the last car of the train has fairly passed the tower, the operator blocks indicators 26 and 22, the one being in his own tower, the other at Mantua tower, and both being marked "Belmont E bound." He thus at once provides himself with a visible reminder of the fact of the block being occupied, and also warns Mantua tower of the approach of a train.

Mantua tower, before he can give the requisite safety signal at 26 B and 27 B (home and distance signals), must block off all trains at 21 B, 22 B and 23 B, and set switches I and H for the crossing, all this being demanded by the arrangement of the interlocking cams. When the train has passed his tower he clears the two indicators 26 and 22 which Belmont tower had previously blocked, and notifies Thirty-sixth street (by Morse instrument) of the approach of the train. He is then at liberty to reset his switches and signals to their normal positions.

Thirty-sixth street tower has had two notifications of the approach of this train, and is probably in readiness for it. Having cleared the crossing of freights (which are numerous in this vicinity), he has moved switches D, E and G from their normal positions to complete the path of this train, and then lowered the semaphore signal 16 S to indicate "all right." The

interlocking mechanism in this case demands that 13 S, 14 S, 15 S, 17 S, 18 S and 20 S should first be at "block," before the switches can be set for this train.

As the train approaches the tower, the operator signals to Thirty-third street and depot tower, by bell wire No. 3, the approach of a train from the Centennial bound south through the tunnel. As the train passes the tower Thirty-sixth street blocks indicators No. 20. "E. bound Thirty-third street," and No. 14 "E. bound Thirty-sixth street;" the first in his own tower as a reminder that the block is occupied, and the second at Thirty-third street as a notification that the train has actually entered the block and is approaching that station.

At Thirty-third street, the switchman and operator having been notified accordingly by bell tap, the train finds the switches set for crossing out on to the track marked "For Southern Trains." The signals 9 E. and 10 E. are in this case left standing at red and green, as they apply only to trains going directly in to the West Philadelphia passenger station. When the train has passed, Thirty-third street clears indicators 20 and 14 previously blocked by Thirty-sixth street.

The Bridge street switchman receives his instructions from depot tower by bell wire No. 2, immediately after the train passes Thirty-sixth street, it being remembered that both Thirty-third street and depot tower were notified at that time by bell wire No. 3. The Bridge street man, in turn, after receiving and answering his instructions from depot tower, communicates with the tunnel switchman by bell wire No. 1, and asks him to clear his signal (7 E). If no train is about to enter the single track from the opposite direction, the tunnel switchman clears 7 E. as requested, and the train may proceed by the Bridge street block. The Bridge street switchman, as soon as the train has passed him, blocks signal 7 E. behind it. Indicator No. 3 (marked "Bridge street,") at the tunnel switch house, being worked automatically by signal 7 E, notifies the occupant of the switch house that his train is near at hand, and he sets his switches conformably.

After passing him the train goes through the tunnel on to the Junction Railroad.

Although the junctions and crossings were so very near to one another, yet the entire signal system was so fully elaborated, and such ample notification always given of the approach of trains, that stoppages never occurred from causes other than legitimate ones.

Safety to passengers being of paramount importance, all the signals were worked on the absolute block principle, and therefore some detention necessarily and properly occurred at the junctions of converging lines, in the case of the nearly simultaneous arrival of two trains.

There are certain points in the equipment which have not yet been touched upon, and some of these will best be shown by supposing the case of a train moving in the opposite direction from that already considered. Let us then briefly outline the course of a train coming from some point south of Philadelphia to the Centennial. The tunnel switchman knows of its approach when it is yet half a mile off, and immediately corresponds with the Bridge street switchman, who, if everything is reported right, clears signal 1 E. Now it will be noted that indicator No. 10 (in depot tower) is worked automatically from this signal 1 E, and the attention of the operator at that point is therefore attracted to the fact that a train is approaching from the south. If the movement of this train will not conflict with those of any others he may be intending to dispatch, he clears signal 6 E (which, it will be remembered, can be cleared only when 5 E stands at "block"), and the train may pass that point unchecked.

As it passes him, the depot tower operator notifies Thirty-third street and Thirty-sixth street (by bell wire No. 3) of its approach and its destination.

Before proceeding further, a point should be noted in regard to switch Z at Bridge street. This switch is on the main out-bound track, and it was deemed necessary that the depot tower operator should know when it was misplaced, and have an audible reminder of the fact. An electric bell of small size was therefore placed in the tower and the circuits so established that this bell would ring continuously when the switch Z was thrown so as to break the main out-bound track.

This precaution was adopted from the fear that the Bridge street switchman might carelessly allow some shifting or other engine to come on the main track without first asking (as the rules prescribe) permission from headquarters. In which case, if at night, the depot tower operator, were it not for his switch bell, would have no knowledge of the fact, and might very probably allow some train or engine to proceed out from the depot and cause collision.

Resuming the matter of the progress of the train towards the Centennial, the next point worthy of notice is the signal 12 S, which, as seen from the approaching train, appears as in fig. 5. This is a combined block and route signal, and informs the engineer of a train not only whether he may proceed, but also what route has been prepared for him.

As the junction at Thirty-sixth street is a triple one, it was feared that the operator at that point might, through some mistake of his own, or of the operator at depot tower, send a train up the wrong line. The route signal was therefore devised, and its *modus operandi* is as follows:

A box is attached to the signal post twenty feet from the ground, and provided with three circular openings or bull's-eyes, each about fifteen inches in diameter, and facing the approaching train. At night three white lights are placed in this box, one at each bull's-eye. Two of these bull's-eyes have each a pair of light sheet-iron doors (on the inside of the box), swung on vertical axes. The third and left hand bull's-eye is not provided with them. Rod connections are made from switches D and F in such a manner that these bull's-eye doors shall be closed when the switches are in their normal position, and open when changed from that position. (Switch D normally stands set for main line West; switch F for New York Division.)

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CONTENTS:

ILLUSTRATIONS:	Page.	EDITORIALS:	Page.
Pennsylvania Railroad Signal	241	Out West	245
Richards' Train Reflector	242	GENERAL RAILROAD NEWS:	
Indicator Diagrams	250	Railroad Law	243
		Traffic and Earnings	243
CONTRIBUTIONS:		Elections and Appointments	247
Signal Equipment of the Penna. Railroad—Centennial System of Tracks	241	Personal	247
Effect on Track of Inside and Outside Connected Engines	242	The Scrap Heap	247
		Old and New Roads	247
EDITORIALS:		Railroad Earnings in April	246
The Low Water Rates	244	Tenth Annual Convention of the Master Mechanics' Association	249
New Railroad Construction	244		
Four Months' Earnings	245	ANNUAL REPORTS:	
Record of New Railroad Construction	245	Terre Haute & Indianapolis	249
		Morris & Essex	249
EDITORIAL NOTES	245	Allegheny Valley	242
		United Railroads of New Jersey	243

Editorial Announcements.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

THE LOW WATER RATES.

Owners of lake vessels seem seriously endeavoring to limit the competition among themselves which has reduced freights to the low figures prevailing. These rates are now very nearly as low as in mid-summer last year, when they were the lowest ever known. They opened lower this year than ever before, and usually the opening rate is two or three times as high as the mid-summer rate. For instance, in 1876 the opening rate was 4½ or 5 cents, while this year it was 3½ cents. The delays by the ice blockade on the St. Clair Flats this season has limited the tonnage offering in May, the fleet bound up from Buffalo reaching Chicago some two or three weeks after the down fleet sailed; but in spite of this rates have been forced down, until now they are reported at 2½ cents for corn and 3 or 3½ for wheat. (The shipments are chiefly corn.) This year the complaint is not that the railroads are taking the grain away from the vessels (they are carrying a much smaller proportion than last year); but that there is an over-supply of tonnage. Notwithstanding the unprofitable nature of the business for the past few years, the lake marine has maintained its tonnage nearly. Not so many vessels are built as formerly, but the new vessels are on the average larger than the old ones which have been wrecked or removed from service. Meanwhile there have been great changes in the lake traffic. The iron ore traffic of Lake Superior has nearly recovered its old proportions, but the lumber business, which employs a large number of vessels, has considerably diminished, and the grain traffic, though on the whole it has not diminished, has been turned to a great extent to the railroads, not simply in the way which was so felt last year, by the roads taking the grain at the lake ports just when it was within easy reach of the vessels, but by a process which has been making progress many years by which the Western roads pick up the grain where it is grown and carry it to the trunk lines without ever unloading it at a lake port. Thus when we learn that two-thirds of the grain shipped from the Western lake ports in a given week went by lake, we must not conclude that the vessels carry two-thirds of the Northwestern grain that is shipped to the East. The total Northwestern shipments are different from and much greater than the total lake ports' ship-

ments. Thus the crop of 1875, which afforded nearly the largest traffic ever known, afforded but a light business to the vessels. This year the railroads are not so likely to take a large proportion of the grain from the lake ports, but this does not make the season better for the vessels than that of 1876, because there is not much grain to carry. The wheat crop in the largest producing States of the Northwest was a failure last year, and not even high prices of grain and low rates of transportation can cause a large traffic when the grain does not exist to be carried. This exceptional cause makes the season remarkably hard for the vessels, for which it is doubtless entirely impossible to get full employment this season, even if they should carry for nothing.

In consequence of this condition of affairs, a general convention of vessel owners was held recently, and at its suggestion local meetings are being held at the leading ports. One of the objects aimed at is the limitation of the tonnage offering. It is very difficult to see how this can be effected, since the number of owners must amount to many hundreds, most of whom have no necessary relations with the others. A combination under these circumstances seems next to impossible. But with prices as they now are, there is likely to be a limitation of the tonnage offering by a process of "natural selection" and "survival of the fittest." The small vessels and all that for any reason are more costly to run than the others are like to be tied up in the course of the season because of inability to earn enough to pay their bare expenses, leaving to the better class of vessels what business there is and perhaps some slight profit to apply on account of the capital invested.

Heretofore the railroads have had as large a share of the grain business as in any year except last; but we presume that this is chiefly because of the contracts at low rates made a year ago, and which will soon expire, we understand. It is not easy to see how the railroads can get any considerable proportion of the grain consigned to the sea-board with water rates as they now are. The poor canal boatmen seem to have made nothing by the reduction in tolls. The cent a bushel comes out of the rates—and more: for last year about 6½ cents was the rate on wheat from Buffalo to New York, against 5 cents now. About 9½ cents per bushel for wheat and 8½ for corn is the present cost of getting grain from Chicago to New York. This is little more than half of the regular rail rate. It does not follow, however, that the railroads will have to reduce their rates or go without the grain traffic. The water competition is for grain to New York and Montreal—chiefly for export grain. The railroads will continue to carry the chief part of the grain designed for consumption at interior points in the East, and when we have a short grain crop this is the chief business. Thus the condition of affairs is not so unfavorable to the railroads as might appear. They are getting less of the traffic which they carried at less than cost last year, but that is hardly a misfortune, and if they manage to get a profitable rate on such grain as they do carry this season they are to be congratulated, especially if they can maintain the present rates on other freight.

There is one effect of the low lake and canal rates which seems inevitable, however, if the railroads do not also reduce their rates, and that is a greater concentration of the export trade at New York than for the past two or three years. It is to be hoped that if the railroads interested feel compelled to do something to prevent the diversion of grain from Baltimore and Philadelphia, they will not make all-rail rates from Chicago and the Northwest to meet the water rates, but make their reductions on lake and rail rates, depending upon their propeller lines to bring grain to them on Lake Erie, and so confining the unprofitable grain traffic to the eastern end of the route.

We hear little more of lake and canal lard and provision shipments by the lake and canal route, concerning which much was said when navigation was opened. A considerable shipment was made then, but it was understood to be an experiment, and as the shipment has not yet had time to arrive, it is premature to pass an opinion as to its success. The fact that it is not followed up immediately, though the water rate on this freight is but two-fifths of the rail rate, indicates that shippers have not a great deal of faith in the experiment. Shipments of provisions have always been made freely by lake and rail; but in this way they get through in a week, while about three times as much time is required by the lake and canal route.

Meanwhile ocean rates have gone up again. During the first two months of the year from four to five pence was about the rate on grain from New York to Liverpool. When the war broke out and prices of grain rose sharply rates rose to 8 or 9 pence for a time. The high prices seemed to prevent shipments, and soon the freights were down to about their old level, which was the case at the beginning of last week. Now, however, that the prices of grain have fallen materially, ocean rates have risen again and are quoted early this week at about 7 to 7½ pence. The whole cost of getting a bushel of wheat from Chicago to Liverpool is now about 27 cents. By the route which most of it follows the distance is about 4,500 miles.

NEW RAILROAD CONSTRUCTION.

We have reported weekly this year as usual the mileage of new railroad constructed in the United States, so far as we have been able to ascertain it; but we have delayed longer than usual the statement of the total completed during the year and the comparisons with corresponding periods of previous years. Early in the year new mileage is reported for some roads without information as to whether the track was laid before or after the 1st of January. Consequently we are unable to state with confidence the mileage of the current year until special inquiries have been made into such cases. We must say that we have not yet been satisfied as to a few miles of road reported since we made up our review for 1876, but it is a very small proportion of the whole.

Before making any comparisons, we will make a summary statement of all the new railroad which we have so far reported as constructed (track laid) since the close of 1876. We will premise that we have not made special efforts to make the list complete, as we do for our annual statement in January, and it is not probable that it is strictly "down to date." It is, however, doubtless quite as much so as any previous statements have been for the same period, including the first five months of the year, nearly.

We will also take this occasion to say that we will be thankful to learn if any part of the road here described was built before 1877, as we presume a little of it was.

Railroads Constructed in the United States since 1876.

Railroads Constructed in the United States since 1876.	Miles.
Portland & Ogdensburg—	
Johnson, Vt., n. w. 5 miles	5
Swanton, Vt., s. w. 10 miles	10
Mohasuck Valley, Woodlawn to Scott's Pond, R. I.	2
Long Island, on Atlantic avenue, Brooklyn, N. Y.	1
Rochester & State Line, Pearl Creek, s. w. to Warsaw, N. Y.	8
Columbia & Fort Deposit, Conecango to Peach Bottom, Pa.	4
Potomac, Frederickburg & Piedmont (3 ft.) extended w. 10 miles to Orange C. H., Va.	10
Spartanburg & Asheville, Spartanburg, S. C., n. w. to South	10
Pacolet River	19
Eureka Iron Co. (5 feet), Standiford to Eureka ore bed, Ala.	1½
Texas Western (3 ft.), Wimberley w. to Pattison, Tex.	11
Corpus Christi, San Diego & Rio Grande (3 ft.) w. to Ono River, Tex.	6
Houston & Texas Central—Waco Branch extended from Waco n. w. to White Rock, Tex.	11
Galveston, Harrisburg & San Antonio, Cibola River w. to San Antonio, Tex.	10
Henderson & Overton, Overton, s. e. to Henderson, Tex.	16
Dallas & Wichita, Dallas, Tex., n. w.	12
Duck River Valley (3 ft.) Fountain Creek s. e. to Lewisburg, Tenn.	14
Cincinnati Southern (in Kentucky)	4
Covington, Flemingsburg & Pound Gap (3 ft.), Johnson, Ky., s. to Flemingsburg	6
Cincinnati & Eastern (3 ft.) Batavia s. to Mt. Oreb, O.	14
Bellare & Southwestern (3 ft.) Quincy to Clairville, O.	6½
Dayton & Southeastern (3 ft.) (in Ohio)	1
Springfield, Jackson & Pomeroy (3 ft.)—	
Springfield, O., e. 5 miles	5
Jackson, O., w. 20 miles	20
Glencoe, Pincinnong & Lake Shore, Glencoe to Lake, Mich.	14
Joplin, Baker, Mo., s. e.	13
Denver & Rio Grande, La Veta Branch (3 ft.), La Veta, Col., w. e.	8
Central Pacific—Loop Line—Shell Mound to Point Pinos, Cal.	13
California Pacific—Vaca Valley Branch—Winter's n. to Madison, Cal.	13
Southern Pacific, Indian Wells, Cal., s. e. to Colorado River	11½
South Pacific coast (3 ft.) Santa Clara s. to San Jose, Cal.	8
Seattle & Walla Walla, Seattle to Renton coal mines, Wash. T.	15

The mileage in the different States is:

Vermont	15	Tennessee	14
Rhode Island	2	Kentucky (2 roads)	10
New York (2 roads)	9	Ohio (4 roads)	40½
Pennsylvania	4	Michigan	14
Virginia	10	Missouri	13
South Carolina	19	Colorado	8
Alabama	1½	California (4 roads)	14½
Texas (6 roads)	66	Washington Territory	15

Of the total, 106½ miles are of 3 ft. gauge.

Considerably more than one-half of the whole (54 per cent.) has been built in the two States of Texas and California, which are also probably the two States where new railroads are most likely to pay. On the other hand Ohio stands next in the number of miles completed, though it is one of the best provided with railroads, and one where the business is already so divided that few of the roads are profitable. Most remarkable of all is the fact that in the Northwestern States—those in the Mississippi valley west of Indiana and Michigan—which but recently was the great field for railroad construction, only one line is reported, and that 13 miles long.

Comparing now the mileage completed up to this time for the past five years, we have:

1873	..... 918 miles.	1876	..... 543 miles.
1874	..... 436 "	1877	..... 393 "
1875	..... 360 "		

This shows a large decrease as compared with 1876—about 28 per cent.—and the total is smaller than for any other year except 1875. There is this to be said, however, that there was favorable weather for railroad construction in the first quarter of 1876, and not this year, and that consequently a larger proportion of tracklaying than usual was done in the early part of last year. There is, however, really a decline in activity in railroad construction this year. Few companies seem to be trying to build now, and if they were they would find it exceptionally hard to get money for a new railroad, the popular opinion, pretty well substantiated by experience, being that money so invested is not likely to be seen again.

The total mileage constructed during each of the four years last past has been:

1873	..... Miles 3,883	1875	..... 2,482
1874	..... 2,925	1876	..... 2,482

Thus down to this time 26 per cent. of the total new mileage of the year had been constructed in 1873, 20½ per cent. in 1874, 16½ per cent. in 1875, and 22 per cent. in 1876. On the basis of 1875, when the smallest proportion was completed early, the construction of 1877 would reach about 2,350 miles; on last year's basis it would be 1,800 miles. Not much weight can be put in deductions from such comparisons, however. From present appearances we should say that the smaller figure is more probable than the larger. There is scarcely any considerable line except the Cincinnati Southern now fairly under way. The Southern Pacific, which is the longest line constructed since 1873, has finally been completed to the Colorado. Nearly all the lines on which work is actually progressing are short ones, or at least only short sections of them are under contract.

The large proportion of narrow-gauge roads is noticeable (37 per cent. of the whole). Nearly one-half of narrow-gauge mileage is in Ohio, and all of the roads constructed in that State so far this year are of 3-ft. gauge. There is no doubt that there is very little room left there for costly roads of any kind, and no more that it presents a reasonably favorable field for very cheap, light railroads, to be cheaply worked at very low speeds, though there is not the least necessity for making their gauge different from that of other roads to answer these requirements, and some important advantages are lost by so deviating from the standard. We shall look, however, to see further extensions of light railroads in the country, and until some one sets the example of a really cheap and light road of standard gauge used for mixed traffic, doubtless light roads will be built of the narrow gauge. We must look first to the old railroad companies to set the example, which they will have abundant opportunity to do as years pass on.

For long lines of heavy railroad there is not much room left in the settled parts of the country, and no immediate prospect of sufficient traffic to support them in the other parts. Doubtless the country will continue to grow, but it by no means follows that the railroad mileage should increase in proportion. One-tenth of the present mileage could abundantly accommodate all the traffic of the country, if the traffic was all within hauling distance of the lines. It is one of the fallacies which do most to mislead opinion on railroad business to assume that a railroad with a paying traffic must be fully occupied. Scarcely any railroad in the world has reached this position. Even the London underground line, with some four hundred trains daily, has room for a yearly increase of traffic. The hope of future reductions in the cost of transportation depends chiefly on the concentration of traffic on a few lines, and is inconsistent with its distribution among many. Trunk lines we have enough of, and shall not be the better but the worse for additions to the number. Feeders will be built as traffic or a prospect of traffic to support them is developed, and with little difficulty, even in these times. But it is now extremely difficult—and long may it continue so—to get capital to construct a railroad which looks for its support to the traffic which it may divert from other roads, now amply accommodating it.

The present rate of increase in our railroad mileage is not positively but only comparatively slow. If we go back to the five years preceding 1873, it seems very slow indeed. In 1872 the mileage of the United States was increased more than one-eighth; last year only about one-thirtieth. But in any other country in the world at all provided with railroads this latter rate would be considered rapid. We have but about 600 inhabitants to support each mile of railroad, and there has been no year yet since the war, with the possible (not probable) exception of 1875, that the increase in railroad mileage has not been larger in proportion than the increase in population. It is a return to something like normal activity in railroad construction that we have experienced, not a retrogression to unhealthy stagnation. None the less has the great change been calamitous to many persons and industries. No sooner had the country so organized its forces as to be prepared to construct and equip some 7,000 miles of road yearly than capital refused to construct more than a third of that amount, and the enormous and costly provisions made for establishing about 5,000 miles of railroad yearly became superfluous. It would be worse for these industries than it is if they had not found partial occupation in doing for our railroads what formerly was done for them abroad. Those which suffer especially are those which provide for the construction of the roads. The demand for equipment increases as the traffic grows, and that has continued to grow since 1873, though not so rapidly as it did before. There are probably some who still hope for what they call a revival in railroad construction. It is probable that they will have long to wait, unless, indeed, there should be a period of activity hereafter in supplying the country with some substitute for our common roads, cheaper even than the cheapest now proposed. The activity is now such that a revival can hardly be expected, or, in the interests of the country at large, desired.

Four Months' Earnings.

April earnings are reported by 31 railroads, with 14,922 miles of road, or nearly one-fifth of the mileage worked in the United States. These roads had 4.3 per cent. greater mileage than last year and earned 3.3 per cent. less. The average earnings per mile fell from \$461 last year to \$427 this—7 per cent. Fourteen roads show an increase in earnings per mile, seventeen a decrease. The most notable increase is that on the Hannibal & St. Joseph, 33½ per cent. Many roads show large decreases; on eleven the decrease (in earnings per mile) is 10 per cent. or more; on nine, 15 per cent. or more; on seven, 20 per cent. or more.

For the four months ending with April we have reports from 30 railroads, with 14,514 miles of road, which is 4.7 per cent. more than they had last year. They earned with this greater mileage 3.4 per cent. less than during the corresponding period in 1876. The earnings per mile fell from \$1,808 to \$1,668, or 7.7 per cent. Ten of the 30 roads report an increase in earnings per mile, the percentage of increase being largest on the St. Joseph & Western (20), the St. Louis, Iron Mountain & Southern (12½), and the New Jersey Midland (9). Six roads show decreases of 20 per cent. or more in earnings per mile. The roads with increased mileage, with two exceptions, show decreased earnings per mile, and in some cases the decrease is very large.

A year ago we had reports from 24 roads with about one-sixth of the mileage of the country. These showed an increase of 3 per cent. in earnings per mile for the month of April, and an increase of 8½ per cent. for the four months. It is well to bear in mind in all comparisons that the first part of 1876 was unusually favorable. If we put the earnings per mile for four months of the past three years side by side, we have:

	1875.	1876.	1877.
Atchison, Topeka & Santa Fe.....	\$715	\$956	\$929
Cairo & St. Louis.....	571	527	551
Canada Southern.....	705	1,235	1,208
Central Pacific.....	3,382	3,516	2,897
Chicago & Alton.....	2,123	2,011	2,003
Chicago, Milwaukee & St. Paul.....	1,381	1,617	1,250
Denver & Rio Grande.....	886	1,070	682
Indianapolis, Bloomington & Western.....	1,237	1,482	1,125
International & Great Northern.....	944	960	982
Missouri, Kansas & Texas.....	1,044	1,236	1,198
Missouri Pacific.....	2,253	2,779	2,772
Nashville, Chattanooga & St. Louis.....	1,622	1,892	1,607
St. Louis, Alton & Terre Haute, Belleville Line.....	2,855	2,239	2,364
St. Louis, Iron Mountain & Southern.....	1,582	1,766	1,982
St. Louis, Kansas City & Northern.....	1,724	2,000	1,914
St. Louis & Southeastern.....	978	924	925
Toledo, Peoria & Warsaw.....	1,185	1,824	1,407

Here nine of the seventeen roads have an increase over 1875, though eight of these nine have smaller earnings than in 1876. It was only the first part of 1876, however, which was exceptionally favorable. During the latter two-thirds of the year earnings were not generally so favorable.

We have an unusually large number of roads in our list this month, but there are very few additions to the really important lines. Eight or ten roads might be selected whose returns would form a much better key to the general condition of railroad business of the country than the figures of the thirty roads contained in our table.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Rochester & State Line.—Extended from Wyoming, N. Y., to Warsaw, 6 miles.

Spartanburg & Asheville.—Track extended 9 miles to South Pacolet River, S. C.

Dallas & Wichita.—The track is extended 7 miles to a point 12 miles northwest from Dallas, Tex.

Covington, Flemingsburg & Pound Gap.—Track laid from Flemingsburg, Ky., west to Johnson, 6 miles. It is of 3 ft. gauge.

This is a total of 28 miles of new railroad, making 393 miles completed in the United States in 1877.

Technical Conventions.

Annual conventions of railroad and engineering associations will be held as follows:

The Master Car-Builders' Association, at Cleveland, Wednesday, June 13.

THE FAST TRAINS have not yet resulted in a reduction of passenger rates, though at this writing they are still running. We announced last week a reduction to \$15 from Chicago to New York; but it was not really made. Instructions had been given to make this reduction Wednesday morning, and we announced it as a fact accordingly. The order was withdrawn, however, at the last moment, and matters have gone on for another week without any change. The Pennsylvania's objection to the Wabash fast train is founded on a connection with the Toledo, Peoria & Warsaw by which shorter time is made from Burlington and some other Mississippi River points, and from Omaha, than by way of Chicago. So far traffic seems not to have been affected to any considerable extent by the changes, but nevertheless, there is no doubt that something will be done if the Wabash and the Pennsylvania fast trains are kept on which will probably increase considerably the expenses or almost wholly destroy the profits of through travel. The alternatives contemplated are putting fast trains over the Lake Shore and the Michigan Central routes to Chicago to match the Fort Wayne train, and the reduction of rates. The former would considerably increase expenses with no advantage to anyone; the latter would destroy the value of

passenger traffic, but what would be lost to the railroads would be gained by the passengers. The latter, however, would probably be most effective in compelling a return to something like the *status quo*. A meeting was held in Buffalo, last Wednesday, at which the several lines interested endeavored to settle the trouble amicably, but the result is not reported as we go to press.

MOBILE desires to cultivate a trade between the Northwest and the West Indies and South and Central America by way of its harbor, arguing that it is the nearest port. The difficulty is not the distance but the want of trade to make regular cargoes. Mobile and Baltimore are about equidistant from Chicago, but from St. Louis it is but 636 miles to Mobile, against 942 to Baltimore and 1,061 to New York. New Orleans, however, is not much further than Mobile from the Western cities and has the advantage of cheap river communication in addition to rail routes, and a large established export trade.

THE FIRST LAKE GRAIN FLEET, nearly 100 vessels, after long delays by ice in the St. Clair flats, reached Buffalo pretty nearly together and so tested that city's facilities for handling grain pretty thoroughly. Within three days 2,307,046 bushels were received and most of it forwarded.

THE POOL OF WEST-BOUND FREIGHT was expected to go into effect June 1, but it is not announced whether the negotiations over the details are completed yet.

OUT WEST.

II.

LOUISVILLE.

The centre of greatest interest in this city, to railroad men, is the Louisville & Nashville Railroad, which is owned chiefly in Louisville and is under a management almost entirely local. The organization differs from that of nearly all other roads from the fact that there is no General Superintendent or General Manager, excepting the President of the company. The operating departments are under the supervision of the following officers, "who act under the immediate direction of the President":

1. General Superintendent of Transportation.
2. General Freight Agent.
3. General Ticket and Passenger Agent.
4. Superintendent of Machinery.
5. Chief Engineer and Superintendent of Road Department.
6. Comptroller.
7. Auditor.
8. Purchasing Agent.

These departments do not take precedence or "rank" each other, as the list given might indicate, but they are all independent of each other and, as the printed regulations state, "act under the immediate direction of the President." Being one of the owners of the road, he has the same interests in it that the stockholders have. By having each of the different departments under independent management, the chief executive and through him the board are enabled to get information direct from each of the departments, which will thus be more likely to be full and correct, and to represent the real condition of things in each, and their relation to each other, than if such reports are made to a superintendent or other person by virtue of whose authority the heads of departments hold their positions, and who has no other interest in the prosperity of the company than that which his salary and possibly his reputation may give him.

The system also has the great advantage that each of the departments may be under the control of a specialist, that is, the machinery department can be under the direction of an experienced and well-educated mechanical engineer; the road department under a civil engineer of like qualifications; for the construction and care of permanent works; the traffic departments under some one who not only has the natural aptitude—which engineers seldom have—but also the experience which is required in that department of the business of transportation. The qualifications needed here are entirely different from, and to a certain extent incompatible with, the habits and training required in the engineering departments. The same thing is true of the accounting departments.

It may seem to some that the system is made more cumbersome on the line named than necessary, and that several of the departments might be consolidated under one head, such as the duties of the Superintendent of Transportation, General Freight and Passenger Agents. The same might be said of the accounting departments; but it is urged by the officers of the Louisville & Nashville road that it is important that the departments of receipts and disbursements of the road should be independent of each other.

At present the position of Superintendent of Machinery and Chief Engineer is held by the same person, Mr. F. de Funiak, who has had the unusual advantage of a training both as a civil and as a mechanical engineer. In the machinery department he has carried out the same system as that which prevails in the general management of the road, that is, he has made the foremen of the different shops independent of each other and of every one but himself. The foremen of the machine shop, for example, of the foundry and of the car shop all report direct to Mr. de Funiak. He thus gets directly from each the condition of things in their respective shops, and these reports are made without the fear that if the exact condition of things is stated the jealousy or enmity of some one else of less authority than their chief will be incurred.

This general plan of organization has now been in practical operation for about two years, and although it is not claimed that it is in any wise perfect or complete, it has thus far worked satisfactorily to the officers of the road. The Baltimore & Ohio road has for many years been operated on a similar system. There they have only three departments, the Transportation, Road, and Machinery, the accounting not being organized under a separate or distinct head. The same

idea has recently been adopted on some other roads, the Eastern of Massachusetts, we believe, and the Illinois Central, although on the latter it is not yet fully worked out. The essential principles involved in it are, first, that the chief executive should be a person whose interests are identical with those of the owners of the road; second, that the heads of the departments should be independent of each other, and responsible only to the chief executive, and third, that no one should be appointed to control any department unless he has a special training for his duties and knowledge of the things which he is to control.

In the shops a rigid economy is being exercised. With this object in view, some of the old engines are being cut up and disposed of. Steel boilers are now generally used, double-riveted all through excepting the longitudinal seams, which are treble-riveted. Heavy ten-wheeled and Mogul engines are used, as the road has very steep grades.

The Louisville Car-Wheel Company has its foundry at the east end of the city. It is doing, as the phrase goes, "its share of the business." This company has adopted a form of guarantee for its wheels, which was given some weeks ago in the *Railroad Gazette*. The report of the service performed in 1876 on the Louisville & Nashville Railroad by the wheels made by this company is a very good one, and may be summarized as follows: The average mileage of 335 wheels, the total number taken out from engines and tenders, was 55,156 miles; the average mileage of 273 wheels, the total number taken out from passenger, baggage, express and postal cars, was 51,701 miles, and of 145 taken out from sleeping cars the average was 53,727 miles.

The Louisville Bridge & Iron Company at the time of this visit had "shut down," although it has quite recently taken several very large contracts, and expects to "start up" very soon. One of its contracts is for the bridge for the Cincinnati Southern Railway over the Tennessee River, and consists of six spans of 210 feet each, one span of 260 feet, and a draw 284 feet long. The other contract is for the bridges on the Belt Railroad around Indianapolis, and is for six spans of 140 feet each. These are all single-span bridges. The aggregate cost will be \$250,000.

There was not time to visit Jeffersonville, across the river, where are the shops of the Jeffersonville, Madison & Indianapolis Railroad, presided over by Mr. Reuben Wells, who is nearly always engaged in some useful work or investigation.

ST. LOUIS.

The journey from Louisville to St. Louis, via Indianapolis, is an easy one, as the roads and their equipment are both in good condition. The last time the writer visited St. Louis the foundations of the great bridge were in process of construction, and engineers were still speculating about its ultimate success. To-day, to those who enter St. Louis for the first time since its construction, it seems like a series of triumphal arches erected in honor of the guests who daily come and go over it. "Have you seen our bridge?" is one of the first questions a stranger is asked, and if you have not, the true St. Louis man rushes down to the river and hires a steamboat, and hastily sends demijohns on board, and takes you to see the "great structure." While in St. Louis all the adjectives expressing admiration were exhausted, and as the bridge has so often been described and illustrated, no time or space will be consumed here in doing it again. As most of our readers know, the railroad tracks are carried on a lower roadway and the carriage and horse-car tracks on top. The upper "deck" is about on a level with the streets of the city, excepting one or two nearest to the river, which it crosses on short bridges. The railroad enters a tunnel at the west end, which passes under Washington avenue and then curves southward to the Union Depot, which is in a sort of ravine, extending in an easterly and westerly direction, and into which the trains of nearly all the roads which centre in St. Louis now run. It is hardly necessary to say that this arrangement is very much more convenient than the old one, of being ferried across the river. The bridge, however, notwithstanding the fact that it is regarded as one of the most splendid examples of engineering in the world, has, we are disposed to believe, produced a sort of uncomfortable impression that it has cost too much.

Of the meetings and doings of the Master Mechanics' Convention, mention has already been made, and therefore no further comment will be made here, excepting that the members came and went very quietly, and the day after the adjournment hardly one of them could be found.

WASHINGTON UNIVERSITY.

Through the hospitality of Professor Charles A. Smith, the writer had an opportunity of visiting the Washington University. This was founded in 1853 and comprises, 1, the Academy, which is a preparatory school for boys; 2, the Mary Institute, which is a seminary for girls; 3, the College; 4, the Polytechnic School; and, 5, the Law School. As the catalogue or prospectus states it, "the connection of the Seminary with the University will be such as to secure to the young ladies all the means of high intellectual culture accessible to young men." The College course does not differ materially from that of other American colleges. In the Polytechnic School there are six courses: 1, Civil Engineering; 2, Mechanical Engineering; 3, Chemistry; 4, Mining and Metallurgy; 5, Building and Architecture; 6, Science and Literature. It would take too much space to give in detail the course of study in each of these departments, but they seem to have been very wisely planned. The chemical and physical laboratories are both tolerably well provided with apparatus for experiment and investigation, but each of them affords plenty of room for the rich men of St. Louis to exercise their liberality. Some of the teachers contemplate the introduction of a course of training in workshop practice, a system which received such a great stimulus in this country during the Centennial Exhibition, by the exhibition of the models from the Polytechnic School of Moscow, and also from other similar schools. The instruction in drawing seems to be admirably conducted, and the faculty have been wise enough to give unusual prominence to free-hand

RAILROAD EARNINGS IN APRIL.

Name of Road.	Mileage.					Earnings.					Earnings per Mile.	
	1877.	1876.	Inc.	Dec.	Per c.	1877.	1876.	Increase.	Decrease.	Per c.	1877.	1876.
Atchison, Topeka & Santa Fe.....	711	711				\$199,965	\$198,955	\$1,010		0.5	\$281	\$280
Burlington, Cedar Rapids & Northern..	401	401				72,435	88,164		\$15,729	17.8	181	230
Calumet & St. Louis.....	146	146				19,480	16,864	2,616		15.4	133	116
Canada Southern.....	452	452				172,973	168,452	4,521		2.7	383	373
Central Pacific.....	1,634	1,315	319		24.3	1,416,000	1,427,035		11,035	0.8	494	494
Chicago & Alton.....	679	650	29		4.5	388,925	363,999	24,926		7.1	571	560
Chicago, Milwaukee & St. Paul.....	1,402	1,400	2		0.1	515,000	650,961		135,961	20.9	367	445
Cleveland, Mt. Vernon & Delaware.....	167	167				31,339	30,217	1,122		3.7	200	189
Denver & Rio Grande.....	269	120	149		124.2	51,447	32,530	18,917		58.2	191	271
Hannibal & St. Joseph.....	296	296				184,287	137,926	46,361		33.6	623	446
Illinois Central, Illinois lines.....	707	707				347,411	402,284		54,873	13.6	491	560
Illinois Central, Iowa lines.....	402	402				99,998	127,985		27,987	21.9	249	318
Indianapolis, Bloomington & Western.....	344	344				113,179	130,308		19,129	14.7	323	370
International & Great Northern.....	515	459	57		12.4	85,500	78,789	6,711		8.5	360	349
Louisville, Cincinnati & Lexington.....	208	208				79,313	77,842	1,471		1.9	381	374
Louisville & Nashville.....	967	921	46		5.0	349,400	321,840	27,560		8.6	360	349
Missouri, Kansas & Texas.....	786	786				221,637	214,280	7,357		3.4	282	273
Missouri Pacific.....	426	426				283,372	283,733	44,639		15.7	771	668
Mobile & Ohio.....	527	527				97,037	105,685		8,648	8.2	184	201
Nashville, Chattanooga & St. Louis.....	341	341				126,372	133,464		7,092	5.3	371	391
New Jersey Midland.....	86	86				54,508	51,068	3,440		6.7	634	594
Paducah & Memphis.....	115	115				12,372	16,975		4,603	37.7	107	143
Philadelphia & Erie.....	288	288				300,835			75,006	24.9	784	1,045
St. Joseph & Western.....	227	227				29,391	24,252	5,139		21.0	130	107
St. Louis, Alton & Terre Haute—Belleville Line.....	71	71				36,407	38,138		1,731	4.5	513	537
St. Louis, Iron Mountain & Southern.....	685	685				261,108	273,895	7,213		2.6	410	400
St. Louis, Kansas City & Northern.....	530	519	11		2.1	284,438	234,001	50,437		13.0	499	451
St. Louis & San Francisco.....	328	328				97,946	94,803	3,143		3.3	299	289
St. Louis & Southeastern.....	356	356				76,369	79,267		2,898	3.1	215	222
Toledo, Peoria & Warsaw.....	237	237				90,113	118,043		27,930	31.7	380	466
Wabash.....	628	628				367,706	375,704		7,998	2.1	586	596
Totals.....	14,922	14,309	613		4.3	\$6,378,325	\$6,598,300	\$220,649	\$426,621	3.3	\$427	\$461
Total increase or decrease.....												

RAILROAD EARNINGS, FOUR MONTHS ENDING APRIL 30.

Name of Road.	Mileage.					Earnings.					Earnings per mile.	
	1877.	1876.	Inc.	Dec.	Per c.	1877.	1876.	Increase.	Decrease.	Per c.	1877.	1876.
Atchison, Topeka & Santa Fe.....	711	670	41		6.1	\$660,309	\$640,751	\$19,558		3.1	\$929	\$956
Burlington, Cedar Rapids & Northern.....	401	401				387,687	387,633		\$99,946	25.8	967	967
Calumet & St. Louis.....	146	146				80,424	76,874	3,550		4.6	551	527
Canada Southern.....	452	452				586,734	598,786		12,052	2.0	1,298	1,325
Central Pacific.....	1,634	1,315	319		24.3	4,734,000	4,623,361	110,739		2.4	2,897	3,616
Chicago & Alton.....	679	650	29		4.5	1,360,204	1,371,973		11,769	0.9	2,003	2,111
Chicago, Milwaukee & St. Paul.....	1,402	1,400	2		0.1	1,764,460	2,263,363		498,902	28.0	1,259	1,617
Cleveland, Mt. Vernon & Delaw.	167	167				112,436	117,899		5,463	4.8	716	750
Denver & Rio Grande.....	269	120	149		124.2	183,431	129,389	54,042		42.9	692	1,070
Hannibal & St. Joseph.....	296	296				603,087	611,226		8,139	1.3	2,037	2,065
Illinois Central, Illinois lines.....	707	707				1,460,350	1,697,281		236,938	14.0	2,066	2,401
Illinois Central, Iowa lines.....	344	344				388,997	509,856		122,859	24.1	1,125	1,482
Indianapolis, Bloom. & West'n.....	516	459	57		12.4	506,568	431,399	75,169		17.5	982	940
International & Gt. Northern.....	308	208	100		48.1	331,202	315,928	15,274		4.8	1,592	1,519
Louisville, Cincinnati & Lex.....	961	921	40		4.3	1,647,196	1,562,305	84,891		5.6	1,714	1,696
Louisville & Nashville.....	786	786				941,591	971,284		29,783	3.1	1,198	1,236
Missouri, Kansas & Texas.....	426	426				1,180,089	1,183,956		3,867	0.3	2,772	2,779
Mobile & Ohio.....	527	527				642,499	666,159		23,660	3.6	1,219	1,264
Nashville, Chattanooga & St. L.....	341	341				564,908	614,652		49,744	8.1	1,657	1,802
New Jersey Midland.....	86	86				193,647	177,811	15,836		8.9	2,252	2,088
Paducah & Memphis.....	115	115				67,275	76,740		19,465	28.4	498	667
Philadelphia & Erie.....	288	288				878,568	1,005,961		127,393	12.7	3,051	3,493
St. Joseph & Western.....	227	227				123,936	108,339	20,697		20.1	545	455
St. Louis, Alton & Terre Haute, Belleville Line.....	71	71				167,876	188,962	8,924		5.6	2,364	2,239
St. Louis, Iron Mt. & Southern.....	685	685				1,360,718	1,309,405	151,313		12.5	1,986	1,766
St. Louis, Kansas City & North'n.....	530	519	11		2.1	1,014,210	1,038,186		23,976	2.3	1,914	2,000
St. Louis & San Francisco.....	328	328				412,655	405,097	7,558		1.9	1,248	1,224
St. Louis & Southeastern.....	356	356				339,309	329,098	10,211		3.1	925	924
Toledo, Peoria & Warsaw.....	237	237				333,483	432,248		98,765	29.9	1,407	1,824
Wabash.....	628	628				1,310,180	1,364,728		54,548	4.0	2,086	2,173
Totals.....	14,514	13,896	618		4.7	\$4,216,558	\$4,257,972	\$568,932	\$1,426,346	3.4	\$1,608	\$1,508
Total increase or decrease.....												

drawing and to artistic work. Thorough training in this art practically gives a person another organ of expression. Mechanical drawing is not neglected, and instruction in that most useful art seems to be very thorough. The admission of the graduates of the girls' seminary to the classes of the college or Polytechnic School, "either as regular or partial students," is an innovation by no means general. Thus far, we believe, no difficulties have been encountered in carrying out what the Board of Directors call this "principle."

There are now 41 students in the Polytechnic School. This number could be increased if the standard of admission were lowered. The teachers here, as in nearly all similar American schools, encounter great difficulty from the insufficiency of the preparatory training of the candidates who present themselves for admission. What is now needed seems to be more and better preparatory schools in which boys may receive a thorough elementary training to prepare them for entering the polytechnic schools.

THE MISSOURI PACIFIC RAILROAD SHOPS.

The shops of this company were partly destroyed by fire a few years ago and have been rebuilt on a much improved plan, and are now very well equipped with tools and machinery. The locomotive department is under the charge of Mr. John Hewitt, and the car department under that of Mr. J. Hodge.

Among the novelties observed was an arrangement for cleaning the boilers of locomotives. This is done by first blowing out one engine and then connecting its mud drum with that of another engine with steam on, by a flexible and extensible pipe, and then blowing hot water into the empty boiler from the other one which is under steam. The violence of the stream of hot water and the commotion produced thereby is said to be much more effective in cleaning out mud than a stream of cold water injected into a boiler. The connecting pipe is made with a stuffing-box and a slip coupling, so that its length can be adjusted to the distance between the engines, which are placed on adjoining tracks in the engine house. The ends of the pipes are connected with coupling nuts to a blow-off cock in the under side of the mud-drum.

Mr. Grant, Master Mechanic of the St. Louis shops (Mr. Hewitt is General Master Mechanic of the whole line), also showed some very ingenious tools, of which he promised to furnish drawings, which will be engraved. One of these, a species

of combined square and level for determining whether the crank-pins are quartered properly, is very ingenious, and would, it seems certain, be very useful in every locomotive shop, as it will show almost in an instant whether the pins are right or not. The description of this and of some other tools will, however, be reserved until the engravings are published.

Mr. Hewitt has been giving special attention to the consumption of fuel on his locomotives, and all fuel stations on his line are now provided with coal-shutes, and each car-load of coal delivered to the fuel agent is charged to him, and all the coal delivered to engines is charged by him to the engine and a return thereof made to the office in St. Louis. At the end of each month the fuel agent is obliged to balance his account, that is, give the quantity on hand and that delivered to engines, which, of course, should balance the amount he has received. The economy of handling coal with these shutles is so great, compared with the expense incurred in doing it by hand, that it seems remarkable that they are not in universal use. They have, however, one defect in the fact that it is impossible for the locomotive runner to know certainly whether he is receiving the full weight of coal with which he is charged. The quantity of coal contained in each pocket is determined by measure and not by weight. Scales are nailed on the sides of the pockets, and the quantity of coal they contain is indicated by these scales.

Much trouble is experienced on this road from bad water. The impurities are, however, chiefly mud, which can be removed much more easily than lime.

In the passenger cars of this line one of the best arrangements for heating is used that we have thus far seen. It consists of a very simple form of stove cased with sheet iron, and provided with a supply flue, through which fresh air from the outside is brought down to circulate between the casing and the stove and thus become warmed. It is then conducted by another flue alongside the truss plank that is on the bottom and side, or in the corner where these join each other. The outside of this flue, or the part which faces towards the centre of the car, is made of sheet iron, and is perforated with holes along its whole length, the number of them increasing towards the centre of the car. The warmed air heats the sheet-iron part of the flue, which thus heats by radiation at the same time that it conducts the warmed air through the car. The

upper end of the supply flue, on top of the car, is provided with a fixed hood with a valve inside, which admits air when the car is running in either direction. A moveable hood moved with a vane would, it is thought, be better.

The Potter draw bar with double links is extensively used on this line. Mr. Hodge has made a very useful improvement in connection with this, which it is hard to describe intelligibly without a drawing, but we will make the attempt. When two cars come into collision with each other, as in ordinary use, if the side links of the Potter draw-bar are in a certain position, they will be driven back against the ends of the draw timbers, and the latter are thus very soon crushed and battered by such use. To avoid this, Mr. Hodge has beveled the ends of the timbers, so that when the link comes in contact with them it is deflected off sideways, and thus does very little if any damage. He covers the end of each timber with a casting, which is more effective both in deflecting the link and in protecting the end of the timber.

Another new thing, to the writer, which is now used on about 800 cars on this road, is Van Liew's grain door. This door is placed inside of the car body, and is attached to it by two links, similar to the links on a parallel rule. It can be raised up on these, and throwing it completely over leaves the door-way clear, or the reverse action closes it. It is then fastened with suitable clamps.

The car shops consist only of a few sheds. Most of the repairs are done out-of-doors. The usual story of poverty and light business is the cause.

THE SHOPS OF THE IRON MOUNTAIN RAILROAD.

These are located at Carondelet, or "South St. Louis," about six miles below St. Louis, but inside of the corporate limits. They too are very inadequate to the demands of the company. They were of their present size—and were then not too large—eight or ten years ago, when the road and its business was very much smaller than it is now. The shops are under the direction of Mr. O. A. Haynes, Master Mechanic.

Any one disposed to study the effects of incrustation can do it on this road, and see the evils of it in its worst form. The water used has a great deal of lime and other impurities in it, which cannot be removed from the boiler without the use of a hammer and chisel. It is necessary to remove the tubes from the boilers frequently and then clean the latter thoroughly. The piecing of tubes thus becomes an important "industry" on this road, and therefore it is not surprising that some special arrangements should have been devised for this purpose. The arrangement used is of a very simple character, but is effective in proportion to its simplicity. It is a small portable forge, about the size and shape of an old-fashioned straw beehive. This is mounted on a tripod or stand, and has transverse openings through it, to admit the tube, and another on the side with a sort of flue attached to it like an enlarged spout of a tea kettle, into which the fuel (coke) is fed into the fire. The bottom is provided with an ordinary coal-stove grate, which can be dumped when the fire is cleaned. The blast is produced by connecting it with an ordinary blacksmith's forge with a suitable pipe. This simple contrivance is said to work very satisfactorily and to facilitate the mending or piecing of flues very much.

Mr. Haynes has also given a great deal of attention to the improvement of smoke-stacks, so as to prevent the throwing of sparks, from the damages caused by which the company has been a great sufferer. If some genius would only investigate this whole subject, and reveal to us the laws which govern it, he would render a great service. At present the whole matter is a complete muddle, and each master mechanic adopts some expedient which is more or less effective—generally less.

The Iron Mountain Company is now involved in litigation, the issue of which will determine who shall control its management. Like many other roads it has by the force of circumstances been obliged to extend its line and reach out on both sides to secure the business which competing lines were coveting, and, like many other roads, its expenditures have increased more rapidly than its profits. Many of the roads in the West are in a similar position, and nothing but the most rigid and intelligent economy will save them.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Wabash.—Mr. H. C. Townsend has been appointed General Passenger and Ticket Agent, in place of W. L. Malcolm, resigned. He has been for four years past General Passenger Agent of the Toledo, Peoria & Warsaw.

Indianapolis & Vincennes.—At the annual meeting in Indianapolis recently the following directors were chosen: Wm. H. Barnes, Thomas D. Meisler, J. N. McCullough, Wm. Thaw, H. B. Houston, George B. Roberts, Thomas A. Scott.

Lexington & Big Sandy.—Mr. Thomas Bradley has been chosen President and Jesse Woodruff Secretary.

Atchison, Topeka & Santa Fe.—At the annual meeting in Topeka, Kan., May 21, the following directors were chosen: Isaac T. Burr, B. P. Cheney, Joseph Nickerson, Thomas Nickerson, Charles L. Paine, F. H. Peabody, C. W. Pierce, Alden Spear, Boston; Ginery Twitchell, Brookline, Mass.; D. L. Lakin, Charles W. Opdyke, C. K. Holliday, J. E. Perley, Topeka, Kan. The new directors are Messrs. Paine and Opdyke, who succeed G. B. Wilber and George Opdyke. The board elected Thomas Nickerson President; F. H. Peabody, Vice-President; E. Wilder, of Topeka, Kan., Secretary and Treasurer; G. L. Goodwin, of Boston, Assistant Secretary and Treasurer.

Pueblo & Arkansas Valley.—The following officers have been re-elected for the ensuing year: President, Joseph Nickerson; Treasurer, Thomas Nickerson; Secretary and Assistant Treasurer, M. D. Thatcher. The road is leased to the Atchison, Topeka & Santa Fe.

Peterboro.—At the annual meeting in Nashua, N. H., May 23, the following directors were chosen: James Scott, G. W. Gill, G. A. Ramsdell, S. A. B. Abbott, J. H. George, G. O. Whiting, George Stark. The road is leased to the Nashua & Lowell.

Peterboro & Hillsboro.—At the annual meeting recently the following directors were chosen: Onslow Stearns, John M. Hill, G. Walker, Concord, N. H.; Jonas Livingston, Peterboro,

N. H.; John C. Campbell, Hillsboro, N. H.; Amos Whittemore, Bennington, N. H.; James A. Rumrill, Springfield, Mass.

Cincinnati Southern.—The directors of the "common carrier" company have chosen the following officers: President, Rufus King; Vice-President, Alfred Gaither; Secretary, Murray C. Shoemaker; Executive Committee, Rufus King, Alfred Gaither, Wm. Glenn, Henry Lewis, R. M. Shoemaker.

Boston & Lowell.—Hon. Thomas Talbot has been chosen President pro tem., in place of Mr. Francis B. Crowninshield, deceased.

Connecticut Western.—The bondholders met in Hartford, Conn., May 23, under the agreement of reorganization, and elected the following directors: T. M. Allyn, Charles T. Hillier, H. S. Barbour, L. B. Merriam, Hartford, Conn.; Wm. L. Gilbert, Caleb J. Camp, George Dudley, West Winsted, Conn.; E. T. Butler, Norfolk, Conn.; Leman W. Cutler, Watertown, Conn.; Wm. H. Barnum, D. J. Warner, Salisbury, Conn.; A. H. Holley, Lakeville, Conn. Of these Messrs. Barnum, Holley, Gilbert, Dudley, Allyn and Hillier were in the old or stockholders' board. The board elected Caleb J. Camp President, in place of Wm. H. Barnum; C. T. Hillier Vice-President, in place of Geo. M. Bartholomew, and re-elected A. L. Gilbert Secretary and Treasurer.

Vicksburg & Deer Creek.—Mr. John Willis is President and has his office in Vicksburg, Miss.

Suncook Valley.—At the annual meeting in Manchester, N. H., May 24, the following directors were chosen: Samuel N. Bell, Nat. Head, Frederick Smyth, L. B. Towle, Charles H. Carpenter, Reuben L. French, M. V. B. Ederly. Immediately afterwards the Suncook Valley Extension stockholders met and elected directors as follows: Samuel N. Bell, Nat. Head, Frederick Smyth, J. H. Colbath, Daniel E. Tuttle, Thomas Coggswell, John M. Durgin. Mr. Samuel N. Bell was chosen President of both companies.

New Orleans, Texas & Pacific.—The officers of this new company are: President, J. F. Crosby; Vice-President, W. R. Baker; Secretary and Treasurer, F. A. Rice. They all reside in Houston, Texas.

United New Jersey.—At the annual meeting in Trenton, May 29, the following directors were chosen: Benjamin Fish, John G. Stevens, Robert F. Stockton, Trenton, N. J.; Ashbel Welch, Lambertville, N. J.; Alfred L. Dennis, Nehemiah Perry, Newark, N. J.; Isaac W. Scudder, Jersey City, N. J.; Wm. Bucknell, Samuel Welsh, Philadelphia; John Jacob Astor, Hon. Hamilton Fish, Cambridge Livingston, New York. There is no change from last year. Mr. Wm. Patterson is State director.

Boston, Concord & Montreal.—At the annual meeting in Plymouth, N. H., May 28, the old board of directors was re-elected, as follows: Alexander H. Tilton, Tilton, N. H.; Joseph P. Pitman, Laconia, N. H.; John L. Rix, Milford, N. H.; Joseph W. Lang, Meredith, N. H.; S. N. Bell, Manchester, N. H.; John E. Lyon, Peter Butler, Boston.

Pacific Mail Steamship Co.—At the annual meeting in New York, May 30, the following directors were chosen: William P. Clyde, Andrew Boardman, Charles H. Mount, Henry Hart, Edward A. Quintard, Charles G. Franklyn, Samuel C. Thompson, George A. Hoyt, Thomas J. Owen. There is no change from the old board.

PERSONAL.

—Mr. George D. Howell, of Rahway, Chief of the Department of Engineering for the United Railroads of New Jersey Division of the Pennsylvania Railroad, is reported to be a defaulter for a considerable amount. He had charge of considerable expenditures, and also had in his hands the collection of rents of the company's real estate, also a considerable amount. The matter has been kept very quiet, and the only facts made public were that there was a defalcation of not over \$50,000, that the amount has been made good and that Howell will probably not be prosecuted, but leaves the company's service. Mr. Howell was connected with the St. Mary's River Lumber Company, and is said to have used the funds in his hands in that business.

—Mr. John P. Williams, for eight years auditor of the Nashville, Chattanooga & St. Louis Company, has become cashier of the Mechanics' National Bank, of Nashville, Tenn.

—Mr. Joseph Isagii, an old and well-known Boston merchant, died in that city May 22. He was a director of the Wisconsin Valley and of some others of the Joy roads. Mr. Isagii was an Armenian by birth and came to Boston in 1837; for many years he was Consul-General for Turkey.

—Mr. Peter B. Brigham, a director of the Fitchburg, President of the Nashua, Acton & Boston, and director of several other companies and a large owner of New England railroad property, died in Boston May 24. He was a wealthy man and had been for several years retired from active business. His fortune was for the most part acquired as keeper of an eating-house, and he was one of the best known men in Boston.

—Mr. W. C. Cleland, General Western Passenger Agent of the Pittsburgh, Fort Wayne & Chicago, died at his residence in Chicago, May 26. He had been a railroad man over 25 years, beginning as a conductor on the Cleveland & Pittsburgh, and was esteemed one of the most efficient passenger men in the country.

—Reports are circulated that Mr. J. H. Rutter, who has been for several years General Freight Agent of the New York Central & Hudson River Railroad, will be made General Manager. Such an appointment may be determined upon, but it is not yet made, and probably will not be until after the approaching election of the company, which will be held next week.

THE SCRAP HEAP.

Railroad Manufactures.

Atkins Brothers' Rolling Mill, at Pottsville, Pa., has an order for iron rails for a North Carolina road.

The Bethlehem (Pa.) Iron Co.'s old mill is running on orders for iron rails.

The Boston Rolling Mills, at Cambridgeport, Mass., are full of work.

Mr. E. R. Saxton, of Buffalo, N. Y., manufacturer of car axles, has added a shop for the manufacture of hardware to his works, having bought a factory at Miller's Falls, Mass., and removed the machinery to Buffalo.

The car shops of Osgood Bradley, at Worcester, Mass., have been closed for the present for want of work.

The Youngstown (O.) Rolling Mill was destroyed by fire on the night of May 26, all the buildings being burned down and the machinery damaged. The mill cost \$100,000; the loss is not yet ascertained but is believed to exceed the insurance, which was \$33,000.

Work is progressing rapidly on the two large blast furnaces of the Southern States Coal, Iron & Land Co. at South Pittsburgh, Tenn.

The Girard (Pa.) Rolling Mill was sold recently at assignee's sale to Evan Morris for \$24,000. It is said that the mill will be started up at once.

The Scott Works, at Reading, Pa., owned by Seyfert, McManus & Co., were burned on the evening of May 24, with the exception of the foundry. The fire started in the pattern room. The loss is said to be \$150,000, and is partly covered by insurance.

The Harrisburg (Pa.) Car Works have an order for 100 freight cars for the Pennsylvania road.

It is said that a plan for the reorganization of the Milwaukee Iron Co. has been prepared, which provides for the organiza-

tion of a new company by the creditors and the resumption of work as soon as the arrangements can be completed. The plan is said to have the support of Mr. Alexander Mitchell and other heavy creditors.

The Columbus (O.) Rolling Mill is running full double turn on iron rails.

The Licking Iron Works, at Covington, Ky., were sold at public sale May 23, by order of T. G. Smith, Assignee of the Phillips & Jordan Iron Co. The property was bid off for \$35,125 by Mr. I. Droege, of Covington, Ky., who is understood to represent an association of iron manufacturers who purpose working the mill.

Wilson, Walker & Co., of Pittsburgh, are now making Safford's safety draw-bar of wrought iron, of a pattern similar to the cast-iron ones heretofore used. Mr. Safford claims that his draw-bar is in use on 146 roads.

Steam Street Car Trials.

The trial of the Baldwin motor on the Newark & Irvington Railroad is stated to have resulted very successfully. The motor used was one of the separate engines, and it was employed to draw the ordinary cars in use on the line. The road is over rolling ground, having three grades on which an extra horse has to be used to assist the two drawing the car, and over these grades the engine drew without difficulty two cars well loaded with passengers, making as fast time as was deemed safe or desirable. No definite figures were published, but the President of the company stated that it had proved itself to be much more economical than horse power. President Dennis, of the Newark & Orange Company, witnessed most of the trials, and it is said that that company will adopt these engines for its suburban lines from Newark to Orange and Belleville, if the necessary permission from the City Council can be had, of which there is little doubt. No trouble was experienced in running the engine through crowded streets, horses taking little or no notice of it.

The Third Avenue Railroad Company in New York has applied for leave to make a trial of steam cars on its road. It purposes to use what it calls "the noiseless steam engine."

The Wrong Man.

An exchange says: "P. M. Arthur, Grand Chief Engineer of the Brotherhood of Locomotive Engineers, with headquarters at Cleveland, Ohio, has been appointed General Manager of the St. Louis, Iron Mountain & Southern Railroad."

We believe this will be news both to Mr. Arthur and the Iron Mountain people. Perhaps Mr. Arthur would not accept the position if offered him; but in this case he was not tried, the new General Manager of the Iron Mountain road being W. H., and not P. M., Arthur.

Stealing an Engine.

As an engine belonging to the Philadelphia, Wilmington & Baltimore Railroad was standing on the track on Washington avenue, Philadelphia, on the afternoon of May 22, during the temporary absence of the engineer and fireman, an unknown man jumped upon the engine and started it at full speed toward the river. Two freight cars which were attached to the engine struck the bumpers at Washington street wharf with such force that the engine was thrown from the track, and the cars ran into the river. The stranger, who was evidently insane, was thrown into the water by the shock, and was drowned.

Going Round the World.

The Utica (N. Y.) Herald, of May 26, says: "Major Rube Allen, the veteran engineer of the Central road, always carries something interesting with him, if nothing more than his good-natured face. Last night on the front of his locomotive was a goodly sized block of California pine. It was started on the front of a locomotive from San Francisco, May 18, by some genius, one week ago to-day, and has been passed from locomotive to locomotive until it reached Major Allen, at Syracuse, last night, and he carried it through Utica on the Atlantic express at 10:10 p. m. The block bore this inscription: 'I want to go around the world in a hurry. Please pass me along to New York and put me on board some steamer and keep me moving.' In all its travels this block will not have a faster ride than Uncle Reuben gave it last night. The railroad men will be curious to know how the block fares in its trip and what time is made."

Fast Time.

A correspondent writes: "Engine Oradell on the New Jersey & New York Railroad, under charge of Engineer Beebe and Fireman Nicholson, recently made a run of 8½ miles in ten minutes, with four cars, the time including two full stops."

A Demand for Damages.

President Wadley, of the Central Railroad of Georgia, recently received the following letter from a man residing on the line of the Atlanta Division of his road:

wmwadley, sir
"had a Big smash up near my House last nite and i want you to come here at Once and bring 6 dollars with you to pay for my colt the Colt nickered the engine did not see it got killed it was a male."

The demand was certainly moderate in amount, if somewhat peremptory in its tone.

Why the Train was Delayed.

The Boston Traveller tells the following: "While traveling over a branch railroad that runs through the rural districts into the edge of New Hampshire, the train drew up at a small station. The passengers gazed out of the car windows to take in anything of interest that might be seen, but the unimportance of the place being noted at a glance, they fell to reading their papers and magazines. After a considerable wait the passengers eyed each other in wonderment, and one bolder than the rest ventured to the platform and looked into the station, and found a tailor measuring the conductor of the train for a suit of clothes. After the conductor had given full directions as to how he desired the suit made, the necessary number of pockets, their position, etc., he came out on the platform in full view of the passengers, looked along the road, as though expecting another train, waved his hand towards the engineer, and the train started off."

Missouri, Kansas & Texas Car Report.

The report for April of the Master Car Builder of this road gives the following figures:

	Passenger.	Loaded freight.
Cars per train.....	4.7	14.60
Total mileage of trains.....	56,316	92,500
Cost of car repairs per train mile.....	7.76 cts.	7.39 cts.
Total mileage of cars.....	265,784	1,856,448
Cost of repairs per car mile.....	1.86 cts.	0.20 ct.
Total cost of repairs.....	\$3,945.82	\$6,216.38
Mileage of Pullman cars.....	25,624	.....
Cost of Pullman car repairs per mile.....	2.88 cts.	.....

The total cost of the Car Department for the month, including all expenses, was \$11,211.43. The credit for old scrap, etc., sold was \$569.26. In computing freight mileage three empty cars are rated as two loaded ones.

OLD AND NEW ROADS.

Foreclosures Sales.

The Evansville, Owensboro & Nashville Railroad was sold at bankrupt sale in Owensboro, Ky., May 29, and bought in for \$60,000 for account of the creditors. The road is completed from Owensboro, Ky., to the Paducah & Elizabethtown crossing, 35 miles, and is partly graded to Adairsville, 60 miles

further. It was sold about a year ago, but the purchase was not completed and the Court ordered a re-sale.

Notice of future sales is given as follows:

R. W. Nicholls, Master in Chancery, will sell the Arkansas Central road under a decree of foreclosure from the United States Circuit Court, in Helena, Ark., June 18. The sale will include 48 miles of finished road of 3 ft. gauge, from Helena to Clarendon, and any right of way or work done between Clarendon and Little Rock, with all the equipment and other property. The purchaser will be required to pay \$40,000 in cash at the time of sale; the balance may be paid in bonds of the issue of July 3, 1871.

The property of the great Southern Company, consisting of right of way and some land, will be sold at Jessup, Ga., July 3, by James P. King, Receiver. The rights of way are on a line from Jessup southward to the Florida line.

The sale of the Jacksonville, Pensacola & Mobile and the Florida Central having been enjoined by the United States Circuit Court, it will be postponed to await the result of the litigation.

Meetings.

Meetings will be held as follows:

Chicago & Northwestern, annual meeting, at the office in Chicago, June 7, at 1 p. m.

Des Moines & Fort Dodge, annual meeting, at the office, No. 61 Wall street, N. Y., June 7, at 2 p. m.

Port Jervis & Monticello, annual meeting, at the office, No. 120 Broadway, New York, June 4, at noon.

Ulster & Delaware, annual meeting, at the office in Rondout, N. Y., June 13, at 1 p. m.

Michigan Central, annual meeting, at the office in Detroit, Mich., June 25, at 9 a. m.

Dividends.

Dividends have been declared as follows:

Connecticut River, 4 per cent., semi-annual, payable July 2.

St. Paul & Pacific.

The Amsterdam committee has announced the payment of \$35 on the coupon due June 1, 1873, on the \$1,200,000 branch line loan and of \$12 on account of the coupon due May 1, 1873, on the \$6,000,000 loan of 1869. Holders of certificates are requested at the same time to give their assent to the plan of reorganization and to give the necessary authority to the committee. A similar announcement was recently made in New York.

The new plan of reorganization provides for a new first mortgage for \$3,700,000, of which only \$1,650,000 will be issued at present and used for the purpose of building the connection of 32 miles from the First Division at Breckridge to the St. Vincent Extension at Barnes; for the building of the remaining 62 1/2 miles of the St. Vincent Extension from Crookston to St. Vincent, and for extending the main line from Melrose to Alexandria. The Brainerd Branch and the Main Line from Alexandria to Barnes it is not proposed to build at present. The existing bonds it is proposed to fund, with the overdue coupons, in new securities, to be issued as follows: For each \$1,000 of the \$1,200,000 First Division bonds, \$1,000 second-mortgage and \$280 preferred income bonds; for each \$1,000 bond of the consolidated loan, \$1,000 preferred income bonds, \$140 common income bonds and \$280 stock; for each \$1,000 bond of 1869, \$420 second-mortgage bonds, \$320 preferred and \$400 common income bonds and \$280 stock; for each \$1,000 Second Division bond, \$1,000 preferred and \$140 common income bonds and \$280 stock, and for each \$1,000 St. Vincent Extension bond, \$333 preferred and \$333 common income bonds and \$333 stock, the new first-mortgage bonds to be taken up by the bondholders, 11 per cent. being allotted to the Branch line, 26 per cent. to the main line and 63 per cent. to the Extension bondholders.

Pennsylvania.

The board of directors has resolved to make a reduction of 10 per cent. on all salaries and wages, with the exception of those of laborers and trackmen receiving \$1 per day or less. The report of the coming reduction was naturally not very well received, and there has been some talk of a general strike. The Brotherhood of Locomotive Engineers has had several meetings which are said to have been called with reference to the reduction, but the proceedings were, of course, private.

It is stated by the officers of the road, that for the six months ending April 30 the pay (on a mileage basis) averaged as follows per month: passenger train engineers, \$99.18; firemen, \$54.80; freight engineers, \$86.12; firemen, \$48.37; construction train engineers, \$85; firemen, \$56.96; yard engineers, \$83.29; firemen, \$56.40. The company claims that it could have dispensed with a number of engineers last fall, after the Centennial closed, but preferred to keep on as many as possible. It is claimed that the pay is higher than on connecting lines and higher also than the men received prior to the Pennsylvania lease. At that time, however, the runs were generally shorter and less work was expected of the men.

At latest accounts no further action had been taken, and it seems to be probable that the men will submit to the reduction and that there will be no strike. Official notice of the reduction has not, we believe, been given yet.

Chicago & Paducah.

In Chicago, May 26, F. E. Hinckley, a director of this company, formerly its President and well known as officer and contractor for a number of minor Illinois roads, was arrested on charges of fraud made by Mr. Fisher, agent for the English bondholders. The charges include misappropriation of the proceeds of bonds sold, fraudulent statements of earnings and expenditure and other acts intended to deceive and defraud the bondholders.

Mr. Hinckley claims that he can establish the falsity of these charges and prove that his dealings with the bondholders throughout have been fair and honest. He charges that his arrest was the result of an attempt to force him to consent to some propositions made by Mr. Fisher for the bondholders.

Central Vermont.

The argument before the Vermont Chancery Court on the petition of the Central Vermont Company for leave to sell the Vermont Central and Vermont & Canada roads in its capacity as trustee, and to buy them as a corporation, was closed last week, and the Court took the matter under advisement. The arguments in the case were mainly on its technical legal aspects and on the power of the Court to order the sale as proposed. The petition was opposed by the Vermont & Canada Company, and by some of the holders of different classes of the Vermont Central bonds.

The Boston & Maine and Eastern Settlement.

An agreement has been concluded between the Boston & Maine and the Eastern companies for an amicable settlement of their past differences, including the claim of the Boston & Maine for damages growing out of the closing of its running arrangements with the Portland, Saco & Portsmouth at the time that road was leased by the Eastern several years ago. The agreement also provides for a division of business to competitive points hereafter, and the maintenance of fair rates to such points and on through business. There has been more or less competition, especially for Maine traffic, ever since the Boston & Maine was completed to Portland; an agreement for division of through business was made some three years ago, but did not last.

Maxwell Land Grant & Railway.

The former plan for the reorganization of this road having fallen through, our Amsterdam correspondent writes that Messrs. Palmer, John Collinson and W. A. Bell now propose to organize a new company to be known as the Anglo-American

Land & Mortgage Company with a capital of \$250,000. This company is to redeem the Maxwell Estate, which was sold in December last for taxes amounting to about \$16,000, to reorganize the property and to secure the construction of a railroad (probably the Denver & Rio Grande) to the Cimarron in New Mexico, the company to be in that case proprietor of one-half the estate. The former proposal for reorganization fell through, partly on account of the general distrust of American enterprises and partly because W. A. Bell withdrew his support, because the committee required that one-half the stock should be held by them in trust. Our correspondent thinks it very improbable that the new plan would be accepted and says that since the announcement of the failure of the first plan the bonds have fallen from 4 to 2 1/2%.

Missouri, Kansas & Texas.

A circular from General Passenger Agent Brown announces that from June 1 a line of Pullman sleeping cars will run between Chicago and Houston, Tex., over this road, the Chicago, Burlington & Quincy and the Houston & Texas Central. Through cars will also run from Galesburg, Ill., to Denison, Tex., and from Sedalia, Mo., to Houston.

The company has opened a ticket office in Chicago. It is located at the corner of Clark and Washington streets.

New York, Brooklyn & Sea Beach.

A company by this name has begun work on a line from East York (just outside of Brooklyn) to Rockaway Beach. Contracts have been let, and it is said that the road is to be completed in July. There are already two railroad routes from New York to Rockaway Beach, besides one partly by railroad and partly by steamboat, and a number of steamboats also run there during the summer.

Lehigh Valley.

This company has given its locomotive engineers notice of a reduction of wages as follows: Salaries of \$3.50 per day to be cut down to \$3, those of \$3.25 to \$2.90, and those of \$3 to \$2.80 per day. The men received this notice with much dissatisfaction, and at once talk of a strike became current. Secret meetings were held on May 27 at Phillipsburg and Wilkesbarre, at which the question of a strike was discussed and it is reported, decided on. The company, it is said, anticipated trouble and has taken steps to prepare for it. At latest dates, however, no action has been taken by either party, though looked for at any time.

Dexter & Monson.

It is proposed to build a railroad from Dexter, Me., the terminus of the Newport & Dexter Branch of the Maine Central, north by west to Monson, about 20 miles. A meeting was held in Abbott, Me., May 22, when a committee was appointed to confer with other towns on the line and to see if the Maine Central was willing to aid in building the road. About one-third of the proposed line is pretty close to the western end of the Bangor & Piscataquis.

Delaware, Lackawanna & Western.

Regular trains began to run through the new Bergen Tunnel at noon of May 24 and all trains now use the new track. The use of the new tunnel has already bettered the time and regularity of passenger trains, and the improvement will be increased when a new time table is adopted, which will probably be next week. The new tunnel is better lighted than the Erie tunnel, daylight being perceptible nearly or quite all the way through. The light is somewhat assisted by the white walls, the tunnel having been whitewashed through its entire length. The ventilation is also noticeably better than that of the Erie tunnel; in warm days the car windows can be left open without inconvenience, while a window left open through the Erie tunnel would fill the car with smoke and coal gas to an extent unpleasant for anyone and even unsafe for delicate people. The better ventilation is probably due to the greater number and larger size of shafts running up to the surface, as there is little difference in the length.

Dallas & Wichita.

The track is now laid for 12 miles from Dallas, Tex., and work is progressing steadily toward Denton, 28 miles further. Iron for the road continues to arrive at Dallas and is being laid down as fast as it comes.

New Orleans, Texas & Pacific.

This company has been organized under the Texas general law to build a railroad from Austin, Tex., northwest to the Texas & Pacific at a point near where the St. Louis & San Francisco road will meet it, if built. The distance is about 450 miles. The capital stock is to be \$20,000,000. The incorporators are George K. Davis, of Boston; W. H. Hart, H. G. Marquand, Henry K. Sheldon, W. F. Buckley, John Barker, Lewis T. Gunther, James T. Rawlins, S. W. Smith and S. W. Morton, of New York; J. F. Crosby, F. A. Rice, W. B. Baker, C. A. Burton and George Goldthwaite, of Houston.

Newburg, Dutchess & Connecticut.

This road was originally the Dutchess & Columbia, was afterwards consolidated with the New York, Boston & Montreal and more lately was sold under foreclosure of the Dutchess & Columbia mortgages, and bought by the bondholders, who have organized the present company. The trustees under the New York, Boston & Montreal consolidated mortgage have now made a demand upon the company for the price of certain rails which, it is claimed, were bought with the proceeds of the consolidated bonds and being left upon the line of the Dutchess & Columbia road, was used in repairs of that road. The matter will probably have to be settled by litigation.

Tennessee Railroad Taxation.

The courts having decided that the law authorizing the payment of a percentage on the gross earnings in lieu of all other taxation was unconstitutional and void, a special board of assessors has been in session at Nashville for the purpose of fixing the valuation of the railroads of Tennessee. Most of the companies have furnished schedules of their property, but several, including the Memphis & Charleston, the Paducah & Memphis, and the Mobile & Ohio decline to do so, claiming charter exemptions. The Louisville & Nashville also claims exemption for part of its line.

Spartanburg & Asheville.

The track is now laid to the South Picolet River, 19 miles from Spartanburg, S. C., leaving 25 miles yet to reach Hendersonville. Work is progressing steadily and the company hopes to reach Cold Spring Gap, in Polk County, N. C., by July 4.

Lexington & Big Sandy.

A meeting was held recently at which officers were chosen and it was resolved to begin suit to recover possession of the completed section of the road, from Lexington, Ky., to Mt. Sterling, now worked by the Louisville, Cincinnati & Lexington Company.

Boston, Hoosac Tunnel & Western.

The Boston *Traveler* says: "There comes from a reliable source the statement that General Burt has succeeded in arranging plans which will give the corporation he represents all the facilities he sought at the hands of the legislature. The first item is that General Burt has purchased \$900,000 of \$960,000 first-mortgage bonds of the Massachusetts Central Railroad at 12 cents on the dollar, paying less than \$125,000 for the road, upon which \$2,700,000 has been spent. General Burt and engineers and bridge-builders are at Mechanicville, N. Y., and expect to have a bridge across the Hudson before Dec. 1. It is also confidently asserted that he has succeeded

in raising capital sufficient to build a spur or a connecting link from Eagle Bridge or some point in Vermont that will allow the corporation to make its western connections with the tunnel without using the Southern Vermont Railroad, now under perpetual lease to the Troy & Boston Railroad."

Gen. Burt does not deny this report, but says it is premature. The Massachusetts Central bonds are nearly all held by one man and represent about 80 miles of partly graded road.

Putnam & Dutchess.

Work is in progress on a section of this road from the Newburg, Dutchess & Connecticut road at Clove Branch Junction, N. Y., north to the Clove Spring Iron Works, about three miles. The road was formerly included in the New York, Boston & Montreal combination.

St. Louis, Kansas & Colorado.

Several meetings have been held along the line to advocate the building of this projected narrow-gauge road from St. Louis westward through Missouri and Kansas to Colorado. One or two towns in Kansas have already voted aid.

Stratford & Lake Huron.

The contract for building this road from Stratford, Ont., to Listowel has been let to W. G. Hay, of Listowel, the work to be completed by November. The town of Palmerston has voted a bonus of \$21,000 to secure the construction of the road to that point.

Maine Central.

The directors have voted to grant assistance to the European & North American in the proposed change of gauge, provided other companies whose roads connect will assist proportionately.

Rochester & State Line.

The track is now laid to Warsaw, N. Y., six miles beyond the last point noted and forty-one miles from Rochester. A large quantity of ties are being distributed along the road south of Warsaw.

Utah Western.

The grading of this road is now completed to the tunnel near Stockton, Utah, thirteen miles westward from the terminus at Lake Point, and thirty-three miles from Salt Lake City. The ties are being distributed along the line and the rails have been purchased.

Indianapolis, Cincinnati & Lafayette.

This company and the Cincinnati, Hamilton & Dayton have, after some negotiation, agreed to pool all their earnings on both passenger and freight business between Cincinnati and Indianapolis. The details of the agreement are not made public, but they include a division of all earnings upon a settled basis, tickets to be good on either line, and the business to be managed by a joint agent. An increase of rates will be made shortly. The new agreement takes effect June 1. The competition between the two roads has been very sharp, with consequent losses to both.

San Antonio & Rio Grande.

It is proposed to build a railroad from San Antonio, Tex., to the Rio Grande at the most convenient point, for the purpose of opening the country west of San Antonio. In view of the importance of such a line in a military point of view, especially in the present disturbed state of the Mexican border, an effort is to be made to secure aid from the Federal Government.

Albert.

This New Brunswick road is now completed from Salisbury, N. B., southeast to Hillsboro, 24 miles, and to some coal mines a short distance beyond that town. An excursion train passed over the road recently, and regular trains will run to Hillsboro very soon.

Bound Brook & Montclair.

Local papers report that a line is being surveyed from Bound Brook, N. J., northeast to Montclair, about 25 miles. The surveys are under the charge of Mr. Adam Driesbach, formerly contractor for the National Railroad. It is reported that the object is to make a connection from Philadelphia with the Montclair & Greenwood Lake road and over that road and its projected extension to Montgomery, N. Y., with the Wallkill Valley road and from that road with the Poughkeepsie Bridge. The project is somewhat shadowy as yet. Most of the projected line is parallel and near to existing roads.

Cincinnati, Hamilton & Dayton.

Notice is given that the bonds which become due June 1 will be paid, with the last coupon, on presentation at the office of the United States Trust Company in New York.

Lafayette, Muncie & Bloomington.

Receiver Chapman has asked the United States Circuit Court for authority to borrow \$50,000 and to issue therefor Receiver's certificates bearing 8 per cent. interest. The money is needed to pay off pressing debts, the principal items of which are unpaid wages, supply bills, rent of engines and judgments against the road. This indebtedness has accrued mainly between Jan. 1 and May 14, the date when the Receiver took possession, and amounts to nearly \$84,000 in all, of which \$50,000 is very pressing.

Erie.

The Receiver's report for March is as follows:

Balance, March 1.....	\$483,448 17
Receipts for the month.....	2,277,280 55
Total.....	\$2,760,728 72
Disbursements for the month.....	2,194,999 06

Balance, April 1..... \$565,729 67

The receipts exceeded the disbursements by \$565,729.67. The amount of Receiver's certificates outstanding April 1 was \$1,949,336.88, being a decrease of \$125,778.92 during the month.

Cincinnati, Sandusky & Cleveland.

The proceedings in this company's case appear to have degenerated into attempts on either side to annoy the other party. The latest move by the Sloane party is an attempt to have President Farlow arrested on charges of defrauding the company. A dispatch says that the Sandusky County Grand Jury has found several indictments against him.

New Orleans Pacific.

The legal obstructions having been removed, an election on the question of raising a tax of 5 mills on the dollar yearly for five years in aid of this road was held in New Orleans May 28. A large majority was given against the tax.

Connecticut Western.

The law approving the agreement between this company and its bondholders having provided that it should go into force when one-third of the bondholders had accepted it, and the holders of \$1,600,000 out of \$3,000,000 bonds having signed the agreement, a meeting was held in Hartford, Conn., May 23, at which the bondholders elected a board of directors, which board will assume the management of the road at once. The new board contains six of the old directors.

The agreement was that preferred stock should be issued to the amount of the bonds, giving the bondholders control of the road. The bonds are to be surrendered in exchange for the new preferred stock; they will not be canceled, however, but will be deposited in trust as security for the execution of the agreement. The right is reserved to the common stock-

holders to resume possession of the property at any time they may see fit, by paying off or buying the preferred stock at par. It simply amounts to a surrender of the road to the bondholders, and to their acceptance of its net earnings in full of interest. The road is 68 miles long, from Hartford, Conn., to Millerton, N. Y.

Jacksonville, Pensacola & Mobile.

The United States Circuit Court at Jacksonville, Fla., has decided to grant the injunction asked for by the Western North Carolina, Western Division, Company, restraining the Governor of Florida from selling this road and the Florida Central. The suit in which the injunction was granted was brought recently by the Western North Carolina, Western Division, Company to recover \$1,000,000, money which, it is claimed, was taken by M. S. Littlefield and J. Swenson, then officers of that company, from its treasury and used in the purchase of the old Pensacola & Georgia and Tallahassee roads for the Jacksonville, Pensacola & Mobile Company, of which they were also officers.

Mobile & Northwestern.

Mississippi papers report that work has been resumed on this road and that a contract has been let to T. T. Lyon, of Mobile, Ala., to complete the section of 15 miles from Dowd's Landing, Miss., on the Mississippi River, opposite Helena, Ark., southwest to Jonestown. It is to be a narrow-gauge road.

Vicksburg & Deer Creek.

Arrangements are being made to resume work on this narrow-gauge road, which is to run from Vicksburg, Miss., to Rolling Fork, 50 miles, with a possible future extension up Deer Creek to Johnsonville and thence to Helena.

Floods in Kansas.

A season of excessive rain in Kansas has been followed by unusually high water in all the rivers and consequent damage to the railroads. On the Atchison, Topeka & Santa Fe all traffic was stopped for several days last week by some bad wash-outs near Topeka, and there were also several washes in the Arkansas Valley. The Kansas Pacific was badly washed west of Lawrence and lost a bridge near Manhattan, the road being closed several days. The Kansas Central also suffered badly; the Missouri Pacific had some troublesome wash-outs, and all the Kansas roads suffered to some extent.

Boston, Clinton, Fitchburg & New Bedford.

Under the authority conferred by a bill passed by the late Massachusetts Legislature, the stockholders of this company have voted to issue \$2,500,000 new 7 per cent. preferred stock, to be issued in settlement of the floating debt. It is said that a number of persons interested in the road have agreed to take a large part of this issue.

Buchanan & Clifton Forge.

Chief Engineer Wm. Jolliffe has begun the final location of this road from the James River & Kanawha Canal at Buchanan, Va., to Clifton Forge. As soon as the plans and specifications can be completed, contracts will be let. The company will have some 300 convicts at its disposal, and they will do a large part of the work.

Coal Mountain, State Line & New England.

A company by this name has been organized to build a line from the bituminous coal fields of Jefferson County, Pa., northeast to the New York line, to connect there with some existing road. The connections to be made are to be intended to develop New England trade, but the route does not seem to be very definitely decided.

River & Rail Union Transit, of St. Louis.

A company by this name has filed articles of incorporation in Missouri. The road to be built is in St. Louis and is to commence where the track of the Union Railway Transit Co. intersects with Poplar street and to run to such points on the levee along the west bank of the Mississippi River as may hereafter be designated by ordinance of the city, the object being to construct and operate a railroad from the place above designated northeastwardly to Spruce street, and thence by cut or tunnel along Spruce street, or by such other route as may be found most desirable and practicable, to the levee, for the purpose of furnishing connection by rail with elevators and warehouses upon the river front. The length of the road is not to exceed five miles and the capital stock is to be \$500,000. The incorporators are A. B. Garrison, John N. Bofinger, Silas Bent, Jos. S. Nanson, Chas. P. Chouteau.

Massillon & Coshocton.

At a meeting of the directors held in Cleveland, O., May 25, it was resolved to change the line so as to make the northern terminus at Canton, O., instead of Massillon. It was also proposed to extend the road to Cleveland, but it was not decided whether to locate a new line or to unite with the partly built Valley road. Finally it was voted to change the name of the company to the Cleveland, Canton, Coshocton & Straitsville Railroad Company.

Manchester & Ashburnham.

A preliminary examination is being made of a line for this projected road to leave some point on the Manchester & North Ware road and run to Peterboro, N. H., to connect there with the Monadnock road.

Attica & Arcade.

A large part of this projected road was graded long ago, but nothing has been done for several years. An effort is now being made to revive it, but it is proposed to change the line and make the northern terminus at Lockport, N. Y., instead of Attica. It is said that this change of line will give a better road and more prospects for business.

Kaufman Tap.

Arrangements are being made to organize a company to build a railroad from Kaufman, Tex., northward to the most convenient point on the Texas & Pacific. The distance is about 13 miles.

Louisburg.

This road is intended to connect a number of coal mines on the island of Cape Breton with the port of Louisburg. A contract for the completion of the road (some work has been already done) has been let to Delaney Oakes, of Nova Scotia, and one for a coal pier at Louisburg to B. Woodell, of Sidney, Cape Breton. Both are to begin work in June.

Olympia.

Some time ago Thurston County, Wash. Ter., voted \$75,000 in bonds, 2,000 acres of land and 200 town lots in Olympia to this company, which purposes building a railroad from Olympia to the coal mines at Tenino, 15 miles. The time for the completion of the road expires soon, but the county commissioners met recently and extended it for a year.

Houston & Texas Central.

The Treasurer requests all persons holding claims against this company not secured by the hypothecation of bonds, including claims held by indorsement or for collection, to forward statement of same to him at Houston. The plan of liquidation proposed by the company is intended to embrace unmatured as well as matured claims, and the statement above requested will therefore give amount of each note, and, if unmatured, when due. Holders of claims are requested to signify their acceptance or rejection of the plan of liquidation proposed

by the company, either in person, by mail or by telegram, on or before June 1, if possible.

Chicago, Rock Island & Pacific.

Notice is given that holders of undrawn 7 per cent. bonds can negotiate for an exchange for the new 6 per cent. bonds on application at the Treasurer's office, No. 13 William street, New York.

Northern Central.

A special meeting was held in Baltimore, May 25, at which the stockholders voted to authorize an issue of \$1,000,000 additional bonds under the consolidated general mortgage (\$10,000,000) of May 26, 1874. These bonds are to be used in settlement of the floating debt, which was stated at the meeting to amount to \$1,236,000. The resolution authorizing the new issue was passed by a stock vote of 62,552 to 1,377, the whole number of shares being 116,840.

The directors have ordered a reduction of 10 per cent. in all salaries and wages over \$1 per day. This action is taken in accordance with promise of increased economy in management made at the stockholders' meeting.

Central, of New Jersey.

A man was arrested May 26 on charges of aiding in defrauding the company by purchasing and reselling tickets on the Newark & New York Branch, which, it is said, some of the conductors had taken up but not canceled. The amount is not believed to be large, however, though it was much exaggerated and some of the New York papers announced that as much as \$100 per day had been taken from the receipts of the branch in this way, which was absurd on the face, as no such sum could be taken from the receipts of this branch without attracting notice at once.

It is stated that the stockholders' committee is preparing a plan of adjustment which is to protect the interests of all parties and which is to be submitted to the stock and bondholders shortly.

Covington, Flemingsburg & Pound Gap.

Track is laid on this road from Flemingsburg, Ky., west to Johnson on the Maysville Division of the Kentucky Central, about six miles, and trains have begun to run regularly on that section. Work at other points is still suspended.

Memphis & Charleston.

A meeting of the stockholders was to be held in Memphis, Tenn., May 30, to decide what action can be taken in the present embarrassed condition of the company. The net earnings of the road have not been enough to pay the interest on the bonds and a large amount is due the State of Tennessee, which the company has no present means of meeting. Two plans have been proposed, the first an assessment on the stock, the collection of which, however, will present many difficulties, if it is not impossible. The second plan is a lease of the road to the East Tennessee, Virginia & Georgia Company, by which, it is thought, greater economy of management can be secured and it is also believed that some arrangement with the bondholders could be made on the basis of such a lease. If nothing can be done to relieve the company, the appointment of receivers will probably soon follow.

New Jersey Midland.

The Receivers' report of the earnings for April and for the four months ending April 30 is as follows:

	April.	Four months.
Passengers	\$14,154 98	\$38,061 90
Freight	17,321 48	76,262 79
Milk	15,236 34	61,844 86
Miscellaneous	7,794 82	27,477 85
Total	\$54,507 62	\$193,647 40
Working and terminal expenses	47,914 92	192,228 55
Net earnings	\$6,592 70	\$41,418 85
Per cent. of expenses	87.92	78.61

The Receivers' account for April is as follows:

Balance, April 1	\$81 15
Earnings of road	54,507 62
Loan account	22,267 08
Total	\$76,855 85
Working and terminal expenses	\$47,914 92
Construction account	1,640 44
Equipment account	2,299 02
Right of way claims	250 00
Middletown, Unionville & Water Gap lease	3,600 55
Discount, interest, insurance, etc.	586 13
Loan account	20,498 68
	76,729 75
Balance, May 1	\$126 10

As compared with 1876, the April earnings show an increase of 6.7 per cent., and those for the four months an increase of 8.9 per cent.

Denver & Rio Grande.

The Auditor's report for March for the entire line was as follows:

Freight earnings	\$92,969 26
Passenger	14,745 48
Miscellaneous	1,514 66
Total earnings (\$183 per mile)	\$49,219 40
Expenses (\$1.70 per cent.)	25,447 76
Net earnings (\$88 per mile)	\$23,771 65

For the three months ending March 31 the earnings were \$131,259 gross and \$55,809 net. In March the earnings included \$1,390 for mails and \$689.72 for other Government business.

Louisville, Cincinnati & Lexington.

The Auditor's report for the month of April is as follows:

	1877.	1876.	1875.
Passenger earnings	\$32,583 72	\$30,562 38	\$31,853 38
Freight	40,234 84	41,021 79	40,058 25
Express, mail, etc.	6,494 78	6,257 74	5,861 98
Total earnings	\$79,313 34	\$77,841 90	\$77,773 61
Expenses and renewals	60,957 68	61,061 72	69,350 39
Net earnings	\$18,355 66	\$16,780 18	\$8,423 22
State taxes	1,166 00	1,066 00	1,311 75
Rentals and guarantees	3,999 46	5,830 76	6,966 60
Construction and improvement	71 56	1,395 83	212 77
Total	\$5,237 02	\$8,292 59	\$8,491 12
Net profit	\$13,118 64	\$8,487 59	Loss \$67 90

The earnings this year were \$381 gross and \$88 net per mile; the expenses were 76.86 per cent. of the gross earnings. There was an increase this year over 1876 of 1.9 per cent. in gross earnings, of 9.4 per cent. in net earnings, and of 54.5 per cent. in net profit.

THE MASTER MECHANICS' ASSOCIATION.

Address of Vice-President Chapman.

Gentlemen of the Association:

In the absence of your President, and according to the constitution, it becomes the duty of the First Vice-President to preside at the meetings of the association.

I very much regret the absence of the President, and hope

that none of you gentlemen will have more cause for regret than I have.

I am well aware that it is no easy task to preside over the meetings of this association, or to assume the duties which have been so ably performed by your President for the past nine years, but trusting in your cordial support, and knowing that any shortcomings from inexperience will be overlooked, gives me courage to undertake the duties devolving upon me.

Our last meeting in the "City of Brotherly Love" was looked forward to with a great deal of apprehension by many of the members of the association, fearing that the attractions offered by the Centennial Exposition would take the attention of the members from the duties pertaining to the meeting of the association; but I think any one who was present or who has read the report of that meeting will be convinced that the members attended well to the business in hand.

I consider it one of our most successful meetings, and it seems to me that each meeting is more interesting than the one preceding. The members are becoming better acquainted with each other and with what is expected of them; in fact, the diffidence for which we have all been so noted is wearing off, and we feel more free to express our opinions in the presence of others, even if in a conflict with them, which I think makes a healthy state of affairs.

I hope the members will bear this in mind, and that the discussions upon the reports of various committees may be both interesting and instructive to all. Great credit is due the various committees for the excellent manner in which the reports were compiled and presented at our last meeting.

At our last meeting it was decided to meet in this city on the second Tuesday in May. It was afterwards noticed that the second Tuesday was the 8th. The General Supervisory Committee took it upon themselves to change the time of meeting to the 15th, as the 8th was considered by many too early in the month for most of the members, as it is usually the most busy portion of the month. At the time the Committee of Arrangements issued their first circular giving the members the results of their efforts to secure proper accommodations for this meeting, we were informed that we would be domiciled at the Southern Hotel, and that the proprietors of that ill-fated palace had generously placed at our disposal the elegant ladies' ordinary. But since the Southern must burn, let us be thankful that we have escaped the ordeal which ended so disastrously to so many, and tender to the survivors of that calamity our sincere sympathy in their sufferings and losses. The signs of the times are as variously read as there are readers; those of a hopeful turn of mind see in the slight increase in business which is at present appearing all over the land an indication of the return of the spasmodic, ephemeral activity which pervaded all industries at the close of the war; and the wish being father to the thought, consider it an actual getting down to the hard-pan of genuine prosperity. I do not. There are still too many of the sanguine temperament among our business men for a permanent return of prosperity, and the indications of a long and bloody European war are not going to help us at all, only delaying the completion of the change in our population, which has for its watchword the maxim of the lamented Horace Greeley, "Go west, young man." When the country receives back from the city the quota it has given, and the population has been so far equalized as to make a fair market for the products of both sections of our broad land will we see actual, lasting prosperity. "Confidence" is not what we want, but a market for our goods, and only the completion of the change will give it.

Having touched briefly the subject of political economy as it is indirectly connected with the objects of the meetings of this association, viz.: getting down to the minimum cost of operating our department of railroading, I will leave the further discussion of the subject to more able heads and return to our legitimate business.

I hope the members will bear in mind the importance of discussions upon the subject-matter contained in the reports of the various committees, and act accordingly. I now invite you to enter upon the business of the convention.

REPORT ON LOCOMOTIVE SLIDE VALVES AND VALVE GEARING.

To the American Railway Master Mechanics' Association:

The committee on "Locomotive Slide Valves and Valve Gearing" appointed at your last annual convention beg leave to submit their report, as follows:

A circular embodying various questions relating to the subjects under consideration was prepared and sent to the different master mechanics throughout the country, but the results obtained have not equalled our expectations; the replies being few in number, and most of them very brief. Those received, however, show a wide difference in practice in the details of a locomotive valve motion, and are so very conflicting that your committee feel constrained to draw largely from their own experience and depend much on their own judgment in making up their report.

The first point requiring our attention in this connection relates to

INDUCTION PORTS.

The proper dimensions of the steam passages of a locomotive cylinder has been a subject of much controversy among locomotive builders, and the dispute is by no means ended. Our inquiries in the matter, however, lead us to believe that a large majority of the master mechanics would favor a port of same length as the diameter of the cylinder, were it not for the excessive friction to be overcome by the use of a valve sufficiently large to correspond to a port of that size. Yet some of our most experienced men contend that a port one-half the length of the diameter of the cylinder is sufficient; but we find that with short ports the valve has to be given an exceedingly long travel, which wears away the valve-face and seat much more rapidly than a shorter one. The ports should be long enough to give admission to the requisite amount of steam to keep the pressure up to its initial point until it is cut off by the valve. Lengthening the port beyond what is necessary to accomplish this is useless, so far as the admission is concerned. It will be seen by reference to the indicator diagram hereto appended that No. 1 has hardly admission enough, as it shows a slight falling off in the steam line. This defect could be remedied by increasing the length of port or travel of valve.

No. 2 is much better in this respect, the steam line running out straight and showing a full and even pressure until the point of cut-off is reached. Diagram No. 1 was taken from an engine with ports 14 in. long and No. 2 from one 16 in. long, both 16 in. x 24 in. cylinders. We conclude, therefore, that the induction ports of a cylinder 16x24 in. should be 14 by 1 1/2 in.

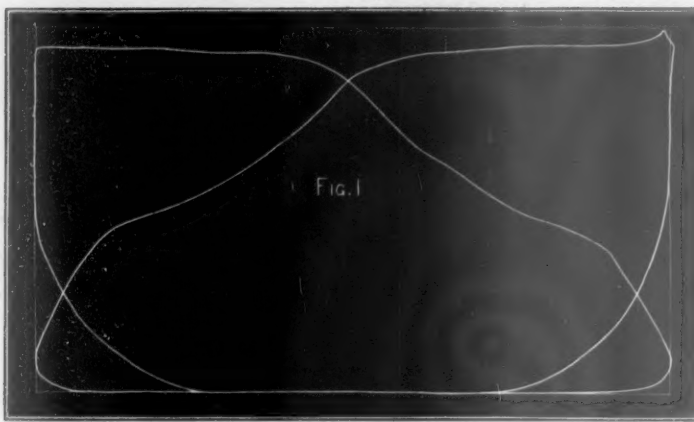
EXHAUST PORTS.

These should be of the same length as the steam ports, and should be as much as 2 1/2 in. wide. The exhaust passages through the cylinder and saddle should have an opening at least 5/8 in. diameter. It is immaterial whether this passage be round or oblong, but its capacity should be perfectly uniform through its entire length from face of valve-seat to the point where the contraction begins for the exhaust nozzle. All sharp angles should be avoided, and all projections on the walls of the passage carefully removed, so that the current of steam seeking an outlet can pass with the least possible construction.

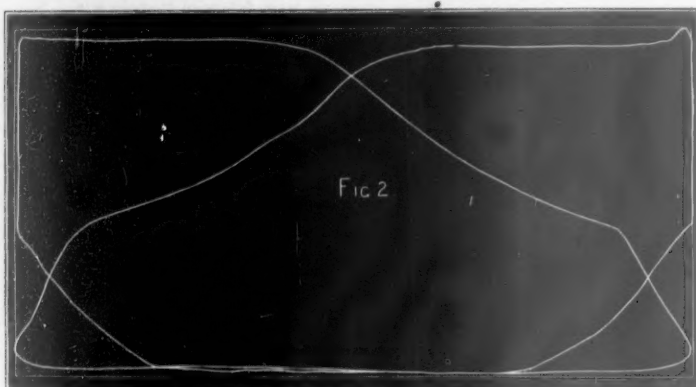
SLIDE VALVES.

The correct and economical working of a locomotive depend almost entirely on having its slide valves so proportioned as to properly distribute the steam in the cylinders. There are many details connected with the valves and the machinery for

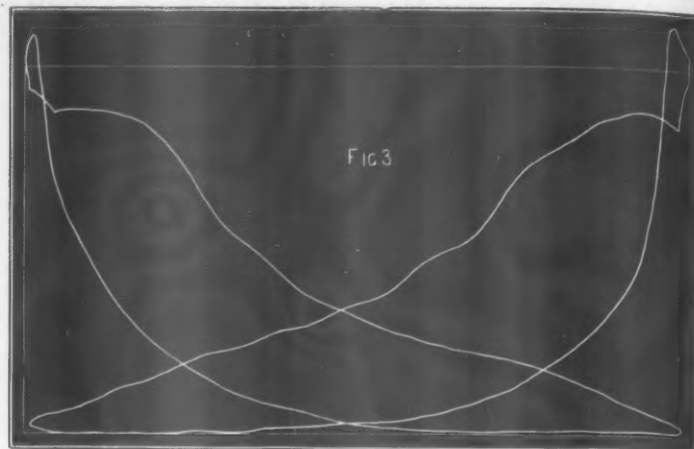
DIAGRAMS AND EXPLANATIONS FOR REPORT ON SLIDE VALVES.



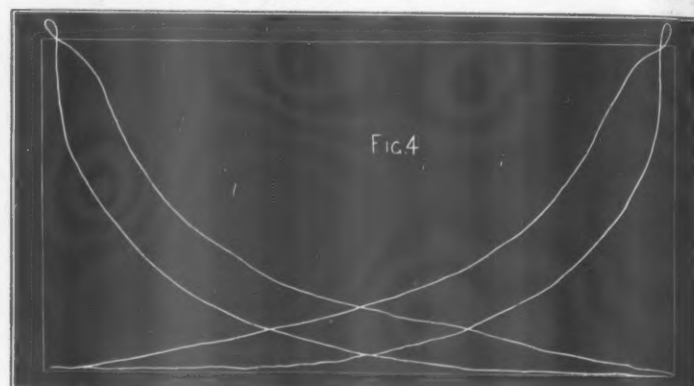
Cylinder.....	16x24 in.
Travel of valve.....	5 in.
Outside lap.....	3/4 in.
Inside lap.....	1/2 in.
Radius of link.....	23 in.
Exhaust of nozzles.....	2 1/2 in.
Boiler pressure.....	125 lbs.
Revolutions per minute.....	60
Scale per inch.....	60 lbs.



Cylinder.....	16x24 in.
Travel of valve.....	5 in.
Outside lap.....	1 1/2 in.
Inside lap.....	3/4 in.
Radius of link.....	72 in.
Exhaust nozzles.....	2 1/2 in.
Boiler pressure.....	125 lbs.
Revolutions per minute.....	60
Scale per inch.....	60 lbs.



Cylinder.....	17x24 in.
Travel of valve.....	5 in.
Outside lap.....	3/4 in.
Inside lap.....	1/2 in.
Radius of link.....	60 in.
Exhaust nozzles.....	3 in.
Boiler pressure.....	130 lbs.
Revolutions per minute.....	120
Scale per inch.....	60 lbs.



Boiler pressure.....	Taken from the same engine as No. 1.
Revolutions per minute.....	118 lbs.

giving them motion which need careful consideration; and among these the most important are the *lap* and *travel* of the valve, and the point of suspension of the link. Lap is given to a valve for a double purpose: first that the steam may be exhausted from the cylinder in season to avoid "back pressure," while the piston is making its return stroke. We find a great difference in the amount of lap given by members of this association, but as there can be an allowance of lap in proportion to the travel that is practically correct, it would seem that more uniformity should be attained. We have prepared and attached hereto a series of tables showing the results obtained by the use of valves with $\frac{1}{2}$ inch and also 1 inch lap; in each case the travel is 5 inches and the exhaust cavity is cut out line and line. These tables show the point where the steam is cut off and also the amount of expansion. It will be noticed that the long lap gives from 7 to 15 per cent. more expansion than the short lap. We assume that every one who has experimented in this direction has found that long lap valves invariably show a saving of fuel over those with a shorter lap. An analysis of the tables will show that this is due to the increased expansion, which gives an augmented power with the same admission; the steam is also expanded down to a lower pressure at the point of exhaust, thus softening the blast and lessening the liability to disturb the fire. In view of these facts, in connection with our own experience, we would strongly recommend the use of valves with 1 inch lap for passenger engines and at least $\frac{1}{2}$ inch for freight engines. The amount of inside lap is somewhat dependent of the length of the port. If the port is the length of the diameter of the cylinder, it will be found that as much as $\frac{1}{4}$ inch lap can be run with economy, but we have learned of cases where, with unusually short ports, it has been necessary to give the valves $\frac{1}{8}$ inch exhaust lead, to enable the engine to clear the cylinder completely and avoid "back pressure" on the return stroke of the piston. The greatest evil attending the use of inside lap is its influence in increasing compression. A certain quantity of compression is needed to take up the slack of the machinery, and it is undoubtedly a saving of steam to partially fill the ports and clearance space between the piston head and cylinder head with compressed air instead of steam from the boiler, but excessive compression should be carefully guarded against. Diagram No. 3 gives a good illustration of excessive compression.

TRAVEL OF VALVES.

The replies to our inquiries in regard to the proper amount of travel to be given locomotive valves are almost unanimous in favor of 5 inches. In the opinion of your committee, the distance is largely dependent on the length of port. It is of the utmost importance that the admission should be such that the initial pressure may be fully maintained up to the point of cut-off. If the ports are 15 in. long, a comparatively short travel can be used; but with shorter ports, the travel must be proportionally increased to give the required opening for maintaining the full pressure. The same rule applies in relation to exhaust. With short ports it is necessary to have a quicker and wider opening than with long ports, in order to obtain a free and perfect exhaust. Your committee therefore conclude that valves should have 5 inches travel where the ports are 14 inches long, and with shorter ports the travel of valve should be correspondingly lengthened.

VALVE LEAD.

Where valves are driven by the link motion, it is not necessary to give lead for cushioning, as there is always compression enough to take up the slack of the machinery. This will readily be seen by reference to the cards in the table of indicator diagrams. It will, however, be found advantageous to give a slight lead to the valves, say $\frac{1}{16}$ inch in full gear.

BALANCED VALVES.

Although we have made careful and extensive inquiries, we

have found no instances where balanced valves are working in all respects successfully in coal-burning engines. With wood burners the case seems to be different, for one of your committee has some twenty engines of this class fitted with balanced valves that have been running for years and working very satisfactorily. They give very little trouble, and some of them have run 80,000 miles without being uncovered. With coal-burning engines the difficulty seems to be, that while running without using steam—down grades, for instance—the vacuum produced by the moving piston sucks coal dust from the smoke-box through the exhaust pipes. This dust causes an abrasion of the wearing surfaces of the valves, and soon produces a leak. Until this difficulty can be overcome, we conclude that balanced valves cannot be successfully used on coal-burning engines.

RADIUS OF LINK.

The radius of the link should be the distance between the centre of driving axle and centre of rocker. Any variation from this rule will give more lead at one end than the other while working steam expansively, but the radius can be several inches longer or shorter without materially affecting the motion. The vital point in designing a valve-link motion is the point of suspension of the link. If the link is suspended from the centre, it will invariably cut off steam sooner in the front stroke than in the back stroke while working expansively. Attention is called to tables Nos. 2 and 4 in illustration of this. It will be seen that in No. 2, with 1-inch lap, the variation is at some points nearly two inches, while in No. 4, with $\frac{1}{2}$ -inch lap, the variation while cutting off at half stroke is three inches. This irregularity could be corrected by moving the point of suspension horizontally back on the link. Tables Nos. 1 and 3 show practically correct valve motions, and their perfection is entirely due to the change in point of suspension. In No. 1 the valve has 1 inch lap, and the suspending point is moved back $\frac{1}{2}$ of an inch. In No. 3 the valve has $\frac{1}{2}$ inch lap, and the suspending point has to be moved back $\frac{1}{4}$ of an inch to insure an equal amount of admission to each end of the cylinder. In No. 5, furnished by Mr. Jeffries, the distribution of steam is very nearly perfect. This result is obtained by raising the point of suspension $1\frac{1}{2}$ inches and moving it back $\frac{1}{4}$ inch from the centre line of link. The distance from centre line of link to centre of the lug for eccentric-rod connections also has a marked influence on the distribution of steam, so that the proper point for suspension is dependent upon a multiplicity of considerations, from which no ruling principle can be deduced that will govern in all cases. Recourse must be had to actual experiment either with the engine itself or a model prepared for the purpose to determine what will best insure the correct distribution of steam.

In conclusion, we will refer to another point relating to a link motion that has an important bearing upon the smooth and economical working of a locomotive, and that is the distance between centre of axle and centre of rocker. It is well known that as the link is raised to cut off the admission for purposes of expansion, the amount of lead, and also the compression, is increased. Now, the shorter the distance between axle and rocker, the greater will be this increase as the engine is linked up. With a distance of 48 inches, for instance, between axle and rocker, the compression will be excessive while cutting off short, say at 6 inches, and this will detract materially from the economic working of the engine. Indicator diagram No. 3 illustrates this point very clearly, showing an enormous amount of compression; while No. 4, cutting off even shorter than No. 3, is much better, as the compression line runs very little above the steam line. Deductions drawn from experiments with the two kinds of valve motion illustrated by the diagrams, plainly indicate the advisability of setting the rocker shaft about 72 inches from centre of axle, when practicable.

Respectfully submitted,

J. N. LANDER,
W. S. HUDSON,
F. A. WAITE, } Committee.

TABLE NO. 1.				TABLE NO. 2.			
Valve 1 in. lap. Travel 5 in.				Valve 5 in. lap. Travel 5 in.			
Point of suspension 9-16 in. back of centre of link.				Point of suspension in centre of link.			
Front stroke.	Back stroke.	Amount of expansion.	Commencement of exhaust.	Front stroke.	Back stroke.	Amount of expansion.	Commencement of exhaust.
Cut-off.	Cut-off.			Cut-off.	Cut-off.		
4 in.	4 in.	10 1/2 in.	14 1/2 in.	3 1/2 in.	4 1/2 in.	8 1/2 in.	12 1/2 in.
6 "	6 "	10 "	14 "	5 "	6 "	8 1/2 in.	12 1/2 in.
8 "	8 "	9 1/2 "	13 1/2 "	7 1/2 "	8 1/2 "	8 1/2 in.	12 1/2 in.
10 "	10 "	9 1/2 "	13 1/2 "	9 1/2 "	11 "	8 1/2 in.	12 1/2 in.
12 "	11 1/2 "	7 1/2 "	11 1/2 "	11 1/2 "	13 1/2 "	8 1/2 in.	12 1/2 in.
15 "	14 1/2 "	6 "	10 1/2 "	14 1/2 "	15 1/2 "	8 1/2 in.	12 1/2 in.
18 "	17 1/2 "	4 "	8 1/2 "	18 "	18 1/2 "	8 1/2 in.	12 1/2 in.

The following are some of the leading dimensions of the valve motion giving the results shown in tables 1, 2, 3 and 4.

TABLE NO. 3.				TABLE NO. 4.			
Valve 1/2 in. lap. Travel 5 in.				Valve 1/2 in. lap. Travel 5 in.			
Point of suspension 11-16 in. back of centre of link.				Point of suspension in centre of link.			
Front stroke.	Back stroke.	Amount of expansion.	Commencement of exhaust.	Front stroke.	Back stroke.	Amount of expansion.	Commencement of exhaust.
Cut-off.	Cut-off.			Cut-off.	Cut-off.		
4 in.	4 in.	8 1/2 in.	12 1/2 in.	3 in.	4 1/2 in.	8 1/2 in.	12 1/2 in.
6 "	6 "	8 1/2 in.	12 1/2 in.	5 "	6 "	8 1/2 in.	12 1/2 in.
8 "	8 "	8 1/2 in.	12 1/2 in.	7 "	8 1/2 in.	8 1/2 in.	12 1/2 in.
10 "	10 1/2 "	8 1/2 in.	12 1/2 in.	9 1/2 "	11 "	8 1/2 in.	12 1/2 in.
12 "	12 1/2 "	6 1/2 in.	10 1/2 in.	11 1/2 "	13 1/2 "	8 1/2 in.	12 1/2 in.
15 "	15 "	5 1/2 in.	9 1/2 in.	14 "	16 "	8 1/2 in.	12 1/2 in.
18 "	18 "	3 1/2 in.	7 1/2 in.	17 1/2 "	18 1/2 "	8 1/2 in.	12 1/2 in.

Tables Nos. 5 and 6 were furnished by E. T. Jeffries, of the Illinois Central Railway, and the following dimensions are given:

From centre of axle to centre of rocker.....	86 in.
Radius of link.....	87 1/2 in.
Length of link lifter.....	9 1/2 in.
Length of connecting rod.....	64 in.
Length of crank.....	13 in.
Distance between centres of lugs for eccentric rods.....	12 in.

Link hung from above.

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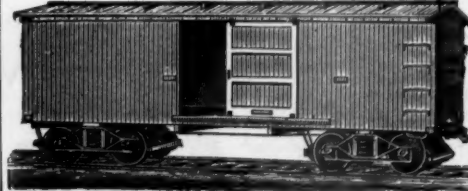
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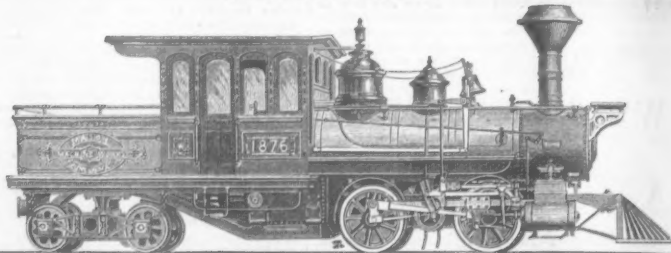
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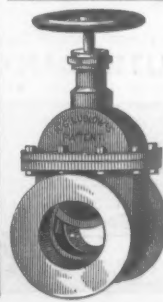
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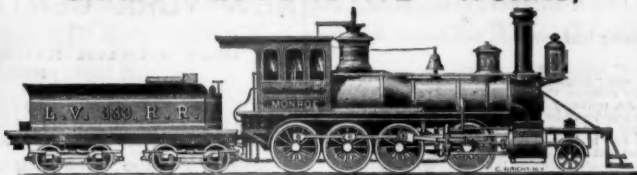
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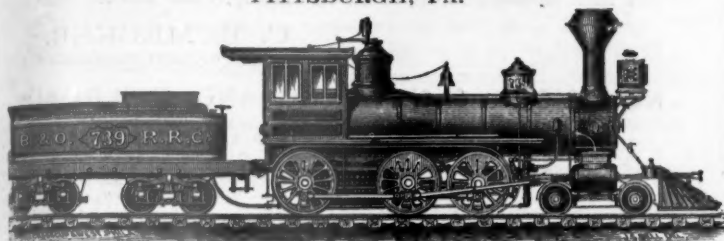
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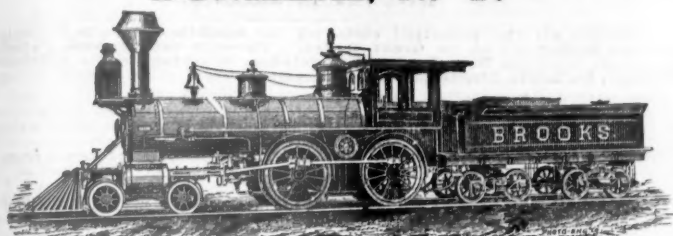
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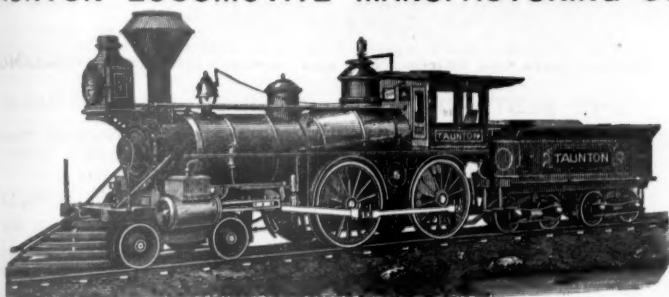


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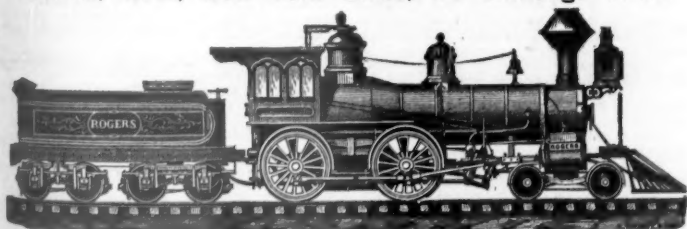
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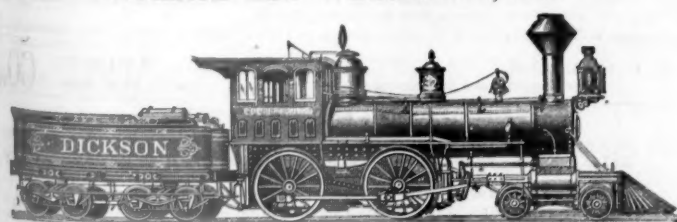
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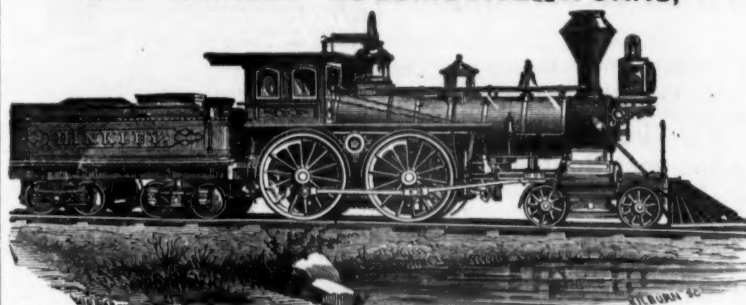
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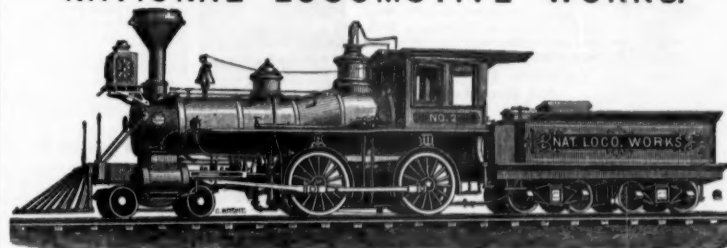
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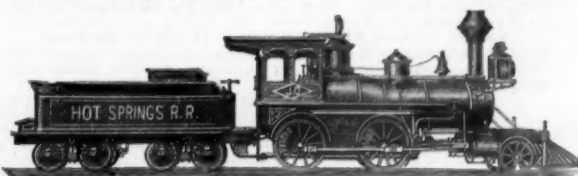
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For Milwaukee—Four through trains daily. Pullman cars on night trains. Pullman parlor chair cars on day trains.

For La Crosse, Wis., Winona and points in Minnesota—One through train daily, with Pullman sleepers to Winona.

For Dubuque via Freeport—Two through trains daily, with Pullman Cars on night train.

For Dubuque via La Crosse via Clinton—Two through trains daily, with Pullman cars on night train to McGregor, Iowa.

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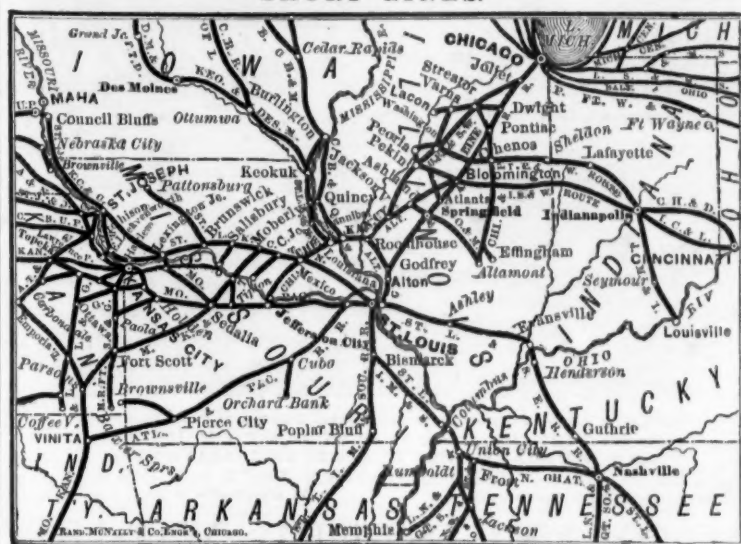
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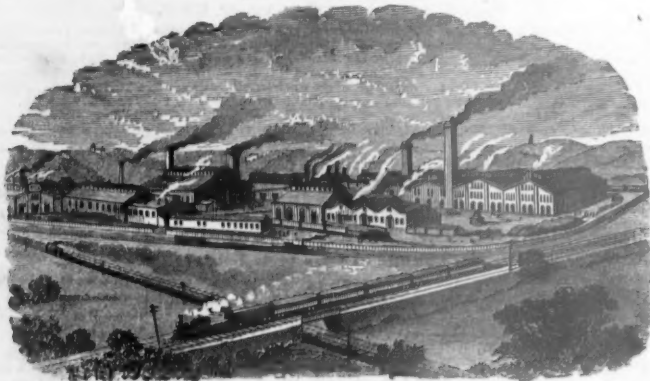
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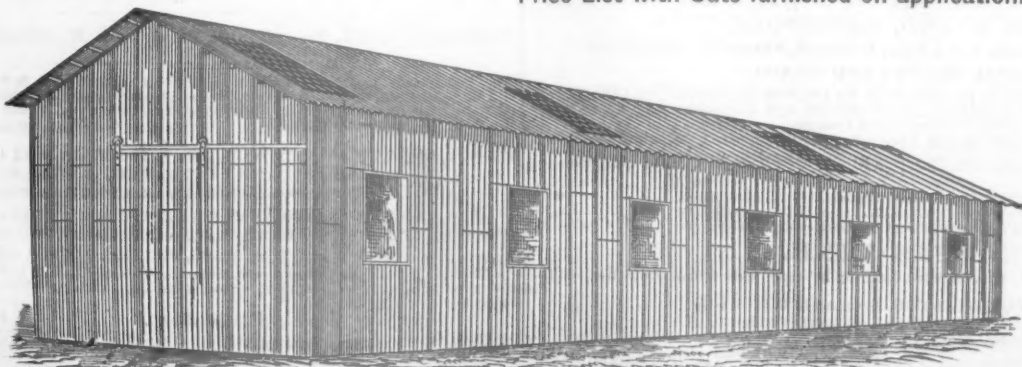
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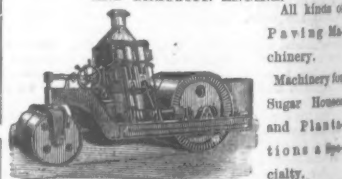
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